# GX Configurator-PN 1.02

Configuration System
for PROFINET IO Networks

## Software Manual

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# About this Manual

The texts, illustrations, diagrams and examples in this manual are only intended as aids to help explain the functioning, operation, use and programming of the open network configuration system MELSOFT GX Configurator-PN.
Separate manuals are available for MITSUBISHI ELECTRIC's various series of MELSEC programmable logic controllers.

This manual is only intended for users with experience in handling automation and communication networks.
For using and usage of this software only the user his own is responsible.
If you have any questions regarding the installation and operation of the software described in this manual, please do not hesitate to contact your sales office or one of your MITSUBISHI ELECTRIC distribution partners.
You can also obtain information and answers to frequently asked questions from our MITSUBISHI ELECTRIC website under www.mitsubishi-automation.com.

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# 1 How to Use

## This manual...

...is a compact guide to using GX Configurator-PN software suitable both for beginners and experienced users upgrading from other systems. The manual includes explanations of the terms and structural concepts about the software and the configuration of an open network system. The manual provides a precise step-by-step description of how to use GX Configurator-PN including sample projects. The PLC series MELSEC Q Series is referenced as MELSEC system Q in this manual.

## If you are not yet familiar with MS Windows...

... please at least read the Windows Fundamentals section in the Windows User's Guide, or work through the Windows Tutorial accessible through the Help menu of the Windows Program Manager. This will teach you what you need to know about using the basic elements of Microsoft ® Windows, and the operating procedures that are identical in all Windows application programs.

## If you have problems with parameter settings, ...

... please refer to the user´s manuals of the concerning open network modules.

## If you get stuck...

... do not despair, help is never far away! If you run up against seemingly insoluble problems, or if you have questions about GX Configurator-PN or the connected programmable logic controller (PLC) configuration, please first refer to the manuals and documentation. Many answers and solutions can also be found directly in the GX Configurator-PN context-sensitive online help system, which can always be accessed by pressing the <F1> key. If you cannot find answers to your questions in any of these places, contact your local MITSUBISHI ELECTRIC representative or call our European headquarters in Ratingen directly. The addresses and phone numbers are provided on the back covers of our manuals.

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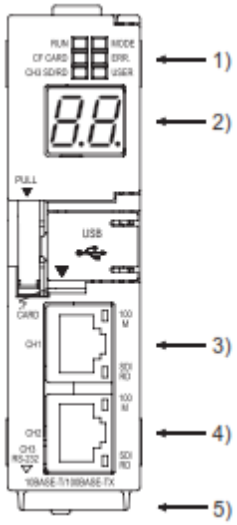
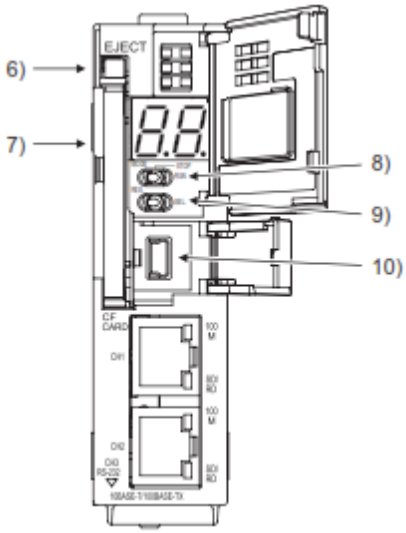
# 2 PROFINET Controller ME1PN1FW-Q

The ME1PN1FW-Q is a PROFINET RealTime (RT) communication master based on the hardware of the Q12DCCPU-V. The restrictions of the Q12DCCPU-V with regard to environmental, mechanical and electrical conditions apply.

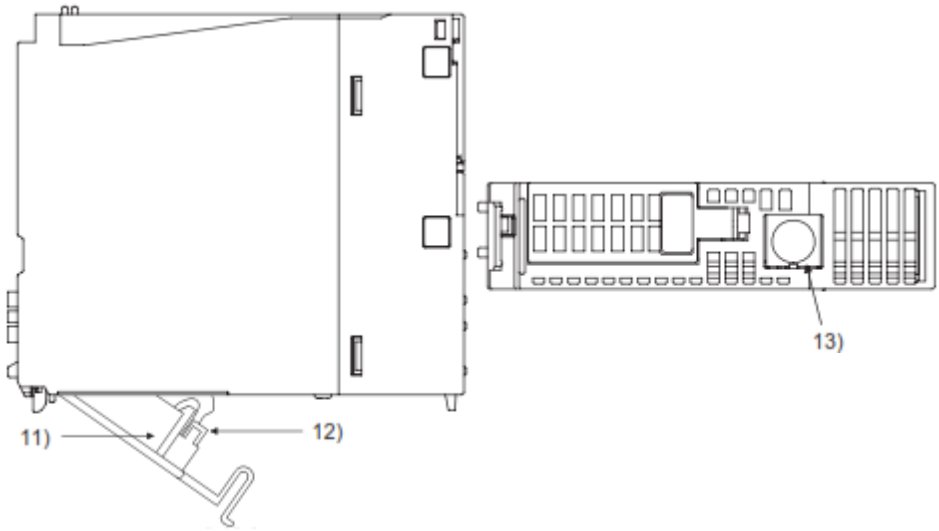
The following drawings indicate the parts of the ME1PN1FW-Q.




**Front face with cover closed**




**Front face with cover open**




**Side face** **Bottom face**

Parts list

| No. | Name | Description |
|---|---|---|
| 1 | Indicator LEDs | for the USER LED see 'User LED', for the other LEDs consult the Q12DCCPU-V manual |
| 2 | 7-segment LEDs | see '7-Segment LED Display' for details |
| 3 | 10BASE-T/100BASE-TX interface connector (RJ45) | Ethernet interface used for configuration and PROFINET I/O communication |

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| No. | Name | Description |
|---|---|---|
| | Channel 1 | |
| 4 | 10BASE-T/100BASE-TX interface connector (RJ45)<br>Channel 2 | Not used for the PROFINET Controller |
| 5 | Serial number plate | Hardware serial number |
| 6 | EJECT button | Press to eject CF card from slot |
| 7 | CompactFlash (CF) card installation slot | Slot for installing CF card |
| 8 | RUN/STOP/MODE switch | Sets the operation mode |
| 9 | RESET/SELECT switch | Used to reset the module |
| 10 | USB interface connector | For USB connections<br>Not supported by the PROFINET Controller. The module can only be accessed via the first Ethernet port. |
| 11 | Battery | Buffers data in RAM |
| 12 | Battery connector pin | Pin to connect battery<br>**Note**: when delivered the battery is not connected to ensure its capacity. |
| 13 | RS-232 interface connector | For RS-232 connections<br>Not supported by the PROFINET Controller. |

## Technical Data

| | |
|---|---|
| **Maximum number of total cyclic input data (1)** | 9228 bytes |
| **Maximum number of total cyclic output data (1)** | 9900 bytes |
| **Maximum number of cyclic input data** | 1437 bytes per device (= IOCR data length) |
| **Maximum number of cyclic output data** | 1437 bytes per device (= IOCR data length) |
| **Maximum number of configured devices** | 128 |
| **Minimum cycle time** | 1 ms |

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| | |
|---|---|
| **Maximum number of total cyclic input data (1)** | 9228 bytes |
| **Maximum cycle time** | 512 ms<br>Different IO-Devices can be configured with different cycle times |
| **RT communication** | RT Class 1 |
| **Alarm processing** | Read/Write Records<br>Limited to 5448 bytes per request |
| **DCP (Discovery & Configure Protocol)** | Supported |
| **RPC (Remote Procedure Call)** | Supported (up to 4 fragments 5448 bytes) |
| **Baud rate** | 100 MBit/s Full-Duplex mode |
| **Data transport layer** | Ethernet II, IEEE 802.3 |
| **LLDP sender** | supported |

**(1) these sizes includes potential padding that could be inserted for variable alignment.**

The following limitations apply:
- The usable (minimum) cycle time depends on the number of IO-devices and the total size of input and output data. For example it is not possible due to performance reasons to have 128 IO-devices communicating with a cycle-time of 1 ms.
- RT over UDP, RT Class 2 and RT Class 3 (IRT) are not supported
- Multicast communication is not supported
- DHCP is not supported (neither for the PROFINET Controller nor for the IO-devices)
- Only one input IOCR and one output IOCR per IO-device
- Only one API (API = 0) is supported. Any profile requesting a different API is currently not supported.
- The IO-device feature “FastStartUp” cannot be used
- WriteMultiple-Record service is not supported

## System Configuration

The ME1PN1FW-Q uses high speed data transfer for the data exchange with the controlling CPU. It can only be used in combination with QnUD(E)-CPUs, which support high speed data transfer. The following QnUD-CPUs do not support high speed transfer and therefore cannot be used
- Q00UJ
- Q00U
- Q01U
- Q02U

### Mounting the PROFINET Controller in a PLC Rack

The PROFINET Controller must be placed in the first slot next to the controlling Qn-CPU. Additional intelligent and I/O modules are supported in the slots following the PROFINET Controller, where they can be accessed by the controlling Qn-CPU. Additional CPUs are not supported.

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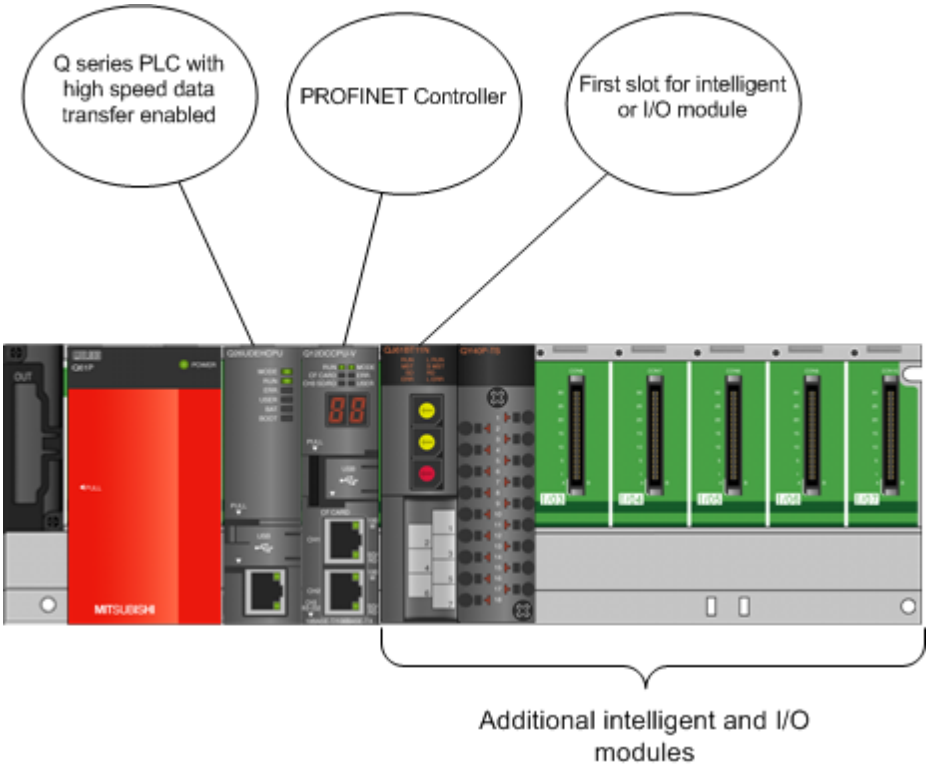
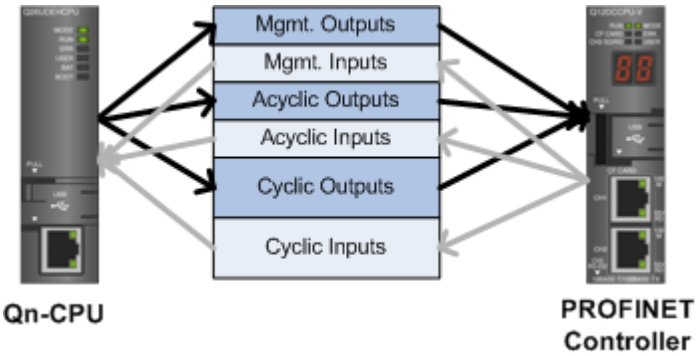

Q series PLC with high speed data transfer enabled
PROFINET Controller
First slot for intelligent or I/O module
Additional intelligent and I/O modules

**Note**: if any of the intelligent modules requires specific settings in the 'I/O Assignment' configuration, these settings must first be set in the controlling Qn-CPU using the PLC programming software (GX Developer, GX IEC Developer, GX Works 2). After this the I/O assignment settings must be copied to the PROFINET Controller by updating the PROFINET Controller using the 'Update Parameters' dialog. Otherwise the Qn-CPU will signal an error, because the I/O assignment settings on Qn-CPU and PROFINET Controller differ.

## 2.1 Shared Memory PLC Interface

The communication between the PLC program and the PROFINET Controller is based on a shared memory area (inside the High Speed Area), which is accessed via buffer devices in the CPU (PLC).



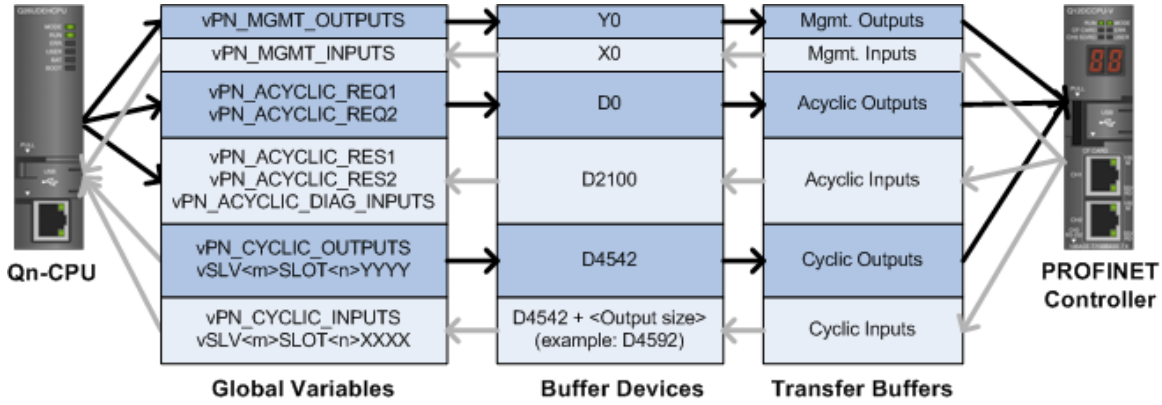

The memory area consists of the following sections

| Block | Description |
|---|---|
| Management Outputs | Control and request flags from the Q-CPU to the PROFINET Controller |

| | |
|---|---|
| Management Inputs | Status and response flags from the PROFINET Controller to the Q-CPU |
| Acyclic Outputs | Request buffer for acyclic communication |
| Acyclic Inputs | Response buffer for acyclic communication |
| Cyclic Outputs | Outputs for I/O devices sent during cyclic data exchange |
| Cyclic Inputs | Inputs from I/O devices received during cyclic data exchange |

## Access to Shared Memory From PLC Program

GX Configurator-PN generates PLC code for the interaction of the application program with the PROFINET Controller. The PLC code contains global variables mapped to buffer devices, which are automatically exchanged between Qn-CPU and PROFINET Controller.
The following diagram shows the principal structure. For details see the section 'Global Variables'.




## Addresses in High Speed Area

The settings for the high speed transfer in both the controlling Qn-CPU as well as the ME1PN1FW-Q are updated by the GX Configurator-PN software. The address range occupied in the high speed area depends on the size of the cyclic data exchanged between the controller and the I/O devices.

The two following tables list the used high speed memory area addresses for outputs and inputs. Because the size of the memory areas used for management and for acyclic communication are fixed, the total size of required high speed buffers depends only on the size of the cyclic data.

For outputs:

| Profinet management (words) | Acyclic Buffer Size (words) | Max Cyclic Output Size (words) | High Speed Area | | |
|---|---|---|---|---|---|
| | | | Calculated Minimal Size (kWords) | Address Start | Address End |
| N/A | N/A | N/A | 0 | N/A | N/A |
| N/A | N/A | N/A | 1 | N/A | N/A |
| N/A | N/A | N/A | 2 | N/A | N/A |

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| | | | | | |
|---|---|---|---|---|---|
| 118 | 2100 | 854 | 3 | 10 000 | 13071 |
| 118 | 2100 | 1878 | 4 | 10 000 | 14095 |
| 118 | 2100 | 2902 | 5 | 10 000 | 15119 |
| 118 | 2100 | 3926 | 6 | 10 000 | 16143 |
| 118 | 2100 | 4950 | 7 | 10 000 | 17167 |

For inputs:

| Profinet management (words) | Acyclic Buffer Size (words) | Max Input Size (words) | High Speed Area | | |
|---|---|---|---|---|---|
| | | | Calculated Minimal Size (kWords) | Address Start | Address End |
| N/A | N/A | N/A | 0 | N/A | N/A |
| N/A | N/A | N/A | 1 | N/A | N/A |
| N/A | N/A | N/A | 2 | N/A | N/A |
| 112 | 2442 | 518 | 3 | 10 000 | 13071 |
| 112 | 2442 | 1542 | 4 | 10 000 | 14095 |
| 112 | 2442 | 2566 | 5 | 10 000 | 15119 |
| 112 | 2442 | 3590 | 6 | 10 000 | 16143 |
| 112 | 2442 | 4614 | 7 | 10 000 | 17167 |

The refresh buffers in the high speed memory area are always aligned to the end address of the high speed area, not its start address. The end addresses is calculated by adding the total size of the high speed area to the start address of the memory area (here 0x10000). If the total size of the refresh buffers is not a multiple of kWords, the gap to the next kWord boundary is filled with the 'user area'. Because the user area always starts at address 0x10000, the start addresses of the refresh blocks are variable.
The following tables contain the formulas for calculating the start and the end address of each refresh block.

Output Areas Offsets Calculation

| Block | Start Address | End Address |
|---|---|---|
| Cyclic Outputs | End Addr. - Output size + 1 | End Addr. |
| Acyclic Outputs | End Addr. - Output size - 2100 + 1 | End Addr. - Output size |

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| | | |
|---|---|---|
| Mgmt. Outputs | End Addr. - Output size - 2100 - 118 + 1 | End Addr. - Output size - 2100 |

Input Areas Offset Calculation

| Block | Start Address | End Address |
|---|---|---|
| Cyclic Inputs | End Addr. - Input size + 1 | End Addr. |
| Acyclic Inputs | End Addr. - Input size - 2442 + 1 | End Addr. - Input size |
| Mgmt. Inputs | End Addr. - Input size - 2442 - 112 + 1 | End Addr. - Input size - 2442 |

Two examples show the application of these formulas for calculating the start and end addresses for a specific combination output and input size, resulting from the corresponding PROFINET configuration.

Example 1: Output size is 900 and Input size is 500.

| | | | Addresses in high speed area | | | | |
|---|---|---|---|---|---|---|---|
| | Size in word | Nb points (K) | start | end | I/O | Acyclic Buffer | PROFINET Management |
| Outputs | 900 | 4 | 10000 | 14095 | 13196-14095 | 11096-13195 | 10978-11095 |
| Inputs | 500 | 3 | 10000 | 13071 | 12572-13071 | 10272-12371 | 10160-10271 |

Example 2: Output size is 1900 and Input size is 1900.

| | | | Addresses in high speed area | | | | |
|---|---|---|---|---|---|---|---|
| | Size in word | Nb points (K) | start | end | I/O | Acyclic Buffer | PROFINET Management |
| Outputs | 1900 | 5 | 10000 | 15119 | 13196-14095 | 11096-13195 | 10978-11095 |
| Inputs | 1900 | 5 | 10000 | 15119 | 12372-13071 | 10272-12371 | 10160-10271 |

## Shared Memory Structure

### Data from Qn-CPU to PROFINET Controller

| Size in Word | Block number (for PLC) | Global Variable Identifiers in Exported PLC Code | Description |
|---|---|---|---|

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| High Speed Transmission Area (0x2710 – 0x5F0F) | | | |
|---|---|---|---|
| 1 | BLOCK 1<br>Size: 118 | vPN_MGMT_OUTPUTS.IOC_START_STOP | Allows to start or stop the PROFINET IO-Controller. |
| 8 | | vPN_MGMT_OUTPUTS.IOD_MGT_MODE | Allow to set IO-Device management in automatic or manual mode. |
| 8 | | vPN_MGMT_OUTPUTS.IOD_START_STOP_DEV | Allow to connect or release connection with an IO-Device. |
| 8 | | vPN_MGMT_OUTPUTS.IOD_CMD_HSK_Y | PLC to PROFINET Controller handshake flag to perform command indicated in IOD_START_STOP_DEV |
| 8 | | vPN_MGMT_OUTPUTS.IOD_MGT_ALARM | Allow to enable or disable alarm management by PLC |
| 8 | | vPN_MGMT_OUTPUTS.IOD_CONSIST | Allow to enable or disable the handshake mechanism for I/O data (so having consistency enabled) |
| 8 | | vPN_MGMT_OUTPUTS.IOD_INPUT_HSK_Y | PLC to PROFINET Controller handshake flags for Inputs |
| 8 | | vPN_MGMT_OUTPUTS.IOD_OUTPUT_HSK_Y | PLC to PROFINET Controller handshake flags for Outputs |
| 1 | | vPN_MGMT_OUTPUTS.ACYC_HSK_Y_REQ1_EXECUTE and ACYC_HSK_Y_REQ2_EXECUTE | PLC to PROFINET Controller handshake bits for acyclic requests (2 bits used) |
| 60 | | Reserved | Reserved for future use |
| 750 | BLOCK 2<br>Size: 2100 | vPN_ACYCLIC_REQ1 | Buffers for acyclic request data (2 buffers - max 1500 bytes each incl. header) |
| 750 | | vPN_ACYCLIC_REQ2 | |
| 600 | | Reserved | Reserved |
| 1 | BLOCK 3<br>Size: 4950 max | vPN_CYCLIC_OUTPUTS.LIVE_WORD_Y | PLC to PROFINET Controller live register |
| Variable, | | variable names for cyclic I/O data are user-defined | output data sent to IO-Devices. The data size is |

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| | | | |
|---|---|---|---|
| Up to 4949 | | | variable up to 9898 bytes. |

### Data from PROFINET Controller to Qn-CPU

| Size in Word | Block number (for PLC) | Global Variable Identifier | Description |
|---|---|---|---|
| High Speed Transmission Area (0x2710 – 0x5F0F) | | | |
| 2 | BLOCK 1<br>Size: 112 | vPN_MGMT_INPUTS.IOC_STS_* | IO Controller Status |
| 8 | | vPN_MGMT_INPUTS.IOD_CMD_HSK_X | PROFINET Controller to PLC handshake flag to acknowledge command in IOD_START_STOP_DEV |
| 8 | | vPN_MGMT_INPUTS.IOD_INPUT_HSK_X | PROFINET Controller to PLC handshake flags for Inputs |
| 8 | | vPN_MGMT_INPUTS.IOD_OUTPUT_HSK_X | PROFINET Controller to PLC handshake flags for Outputs |
| 1 | | vPN_MGMT_INPUTS.ACYC_HSK_X_* | PROFINET Controller to PLC handshake bits for acyclic requests (2 bits used) |
| 8 | | vPN_MGMT_INPUTS.IOD_ALARM_IND | Alarm indication |
| 8 | | vPN_MGMT_INPUTS.IOD_CONN_STS | Connection status flag<br>0: IO-device Not connected<br>1 Device connected |
| 8 | | vPN_MGMT_INPUTS.IOD_ERR_STS | Device ERROR flag<br>0: device no error<br>1 Device in error |
| 61 | | Reserved | |
| 750 | BLOCK 2<br>Size 2442 | vPN_ACYCLIC_RES1 | Buffers for acyclic request answer (2 buffers - max 1500 bytes each incl. header) |
| 750 | | vPN_ACYCLIC_RES2 | |
| 20 | | vPN_ACYCLIC_DIAG_INPUTS.ADV_DIAG_* | Advanced diagnostic information about issues |

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| | | | |
|---|---|---|---|
| | | | with PROFINET |
| 256 | | Reserved for future time stamping | Not Used. Reserved |
| 2 | | vPN_ACYCLIC_DIAG_INPUTS.CNF_CRC | Configuration CRC value. |
| 64 | | vPN_ACYCLIC_DIAG_INPUTS.IOD_ADV_STS | Advanced device status<br>1 : Never Connected<br>0: Connected<br>2: Disconnected<br>3: Connected in error (IOPS/IOCS/APDU STATUS in error state)<br>4: time Out |
| 600 | | Reserved | |
| 1 | BLOCK 3<br>Size 4678 max | vPN_CYCLIC_INPUTS.LIFE_WORD_X | PROFINET Controller to PLC live register |
| Up to 4677 | | variable names for cyclic I/O data are user-defined | Input data received from each IO-Device. Size up to 9345 bytes. |

### 2.1.1 Management Area

#### IOC_START_STOP Register

This register is set or cleared by the control CPU to start or stop the PROFINET Controller.

| From CPU to PROFINET IO-Controller | | |
|---|---|---|
| **Global Var. Identifier** | **Values** | |
| | **0** | **1** |
| vPN_MGMT_OUTPUTS.IOC_START_STOP | IO-controller has to be stopped<br>If the IO-controller is not started, nothing is done by PROFINET firmware.<br>If the IO-controller is starting or started, each connection will be automatically released by the firmware, even if the connection is in manual management. | IO-controller has to be started<br>If the IO-controller is started, nothing is done by PROFINET firmware.<br>If the IO-controller is stopping (stop sequence), the firmware will continue the stop sequence up to the end and then will initiate again a start sequence.<br>If the IO-controller is stopped, the IO-controller will be started. The controller will try |

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| | | |
|---|---|---|
| | | to start each connection with an IO-device, which is configured with automatic management mode(1). Each connection with a device in manual management mode will not be up until the PLC explicitly sends a command to the device. |

(1) See IOD_MGT_MODE registers. By default the IO-device management is in automatic mode (bits are 0). If the PLC does nothing, every connection will automatically be started, when the IO-controller is started.

## IOD_MGT_MODE Registers

With these 128 bits the PLC can indicate, how each connection to an IO-device should be managed by the firmware.

- for an IO-device in automatic mode the IO-controller will initiate the connection, until the connection is established.
- for an IO-device in manual mode the IO-controller will wait for commands from the PLC to manage the connection (see IOD_START_STOP and IOD_CMD_HSK_Y registers).

| From CPU to PROFINET IO-Controller | | | |
|---|---|---|---|
| **Global Variable Identifier** | **IO-Device Number** | **Values** | |
| | | **0** | **1** |
| vPN_MGMT_OUTPUTS.IOD_MGT_MODE[0]<br>…<br>vPN_MGMT_OUTPUTS.IOD_MGT_MODE[15] | 0<br>..<br>15 | Automatic<br>..<br>Automatic | Manual<br>..<br>Manual |
| vPN_MGMT_OUTPUTS.IOD_MGT_MODE[16]<br>…<br>vPN_MGMT_OUTPUTS.IOD_MGT_MODE[31] | 16<br>..<br>31 | Automatic<br>..<br>Automatic | Manual<br>..<br>Manual |
| … | … | … | … |
| vPN_MGMT_OUTPUTS.IOD_MGT_MODE[116]<br>…<br>vPN_MGMT_OUTPUTS.IOD_MGT_MODE[127] | 116<br>..<br>127 | Automatic<br>..<br>Automatic | Manual<br>..<br>Manual |

## IOD_START_STOP_DEV Registers

With these 128 bits the PLC specifies, which command will be executed when the corresponding command handshake flag (see IOD_CMD_HSK_Y) is set. These registers are relevant only for devices, which are in manual management mode (see IOD_MGT_MODE).

| From CPU to PROFINET IO-Controller |
|---|

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| Global Variable Identifier | IO-Device Number | Values | |
|---|---|---|---|
| | | 0 | 1 |
| vPN_MGMT_OUTPUTS.IOD_START_STOP_DEV[0]<br>…<br>vPN_MGMT_OUTPUTS.IOD_START_STOP_DEV[15] | 0<br>..<br>15 | Release connection | Establish connection |
| vPN_MGMT_OUTPUTS.IOD_START_STOP_DEV[16]<br>…<br>vPN_MGMT_OUTPUTS.IOD_START_STOP_DEV[31] | 16<br>..<br>31 | | |
| … | … | | |
| vPN_MGMT_OUTPUTS.IOD_START_STOP_DEV[116]<br>…<br>vPN_MGMT_OUTPUTS.IOD_START_STOP_DEV[127] | 116<br>..<br>127 | | |

## IOD_CMD_HSK_X and IOD_CMD_HSK_Y Registers

With the 128 bits the PLC can ask the PROFINET Controller to execute command(s) previously defined in the corresponding IOD_START_STOP register(s).
When the command(s) are completed, the PROFINET Controller sets the corresponding bit(s) in the IOD_CMD_HSK_Y registers. The PLC can then verify the connection status via the IOD_CONN_STS registers.

| From CPU to IO-Controller | | From IO-Controller to CPU | |
|---|---|---|---|
| Global Var. Identifier | Function | Global Var. Identifier | Function |
| vPN_MGMT_OUTPUTS.IOD_CMD_HSK_Y[0] | Trig command for device 0 | vPN_MGMT_INPUTS.IOD_CMD_HSK_X[0] | command for device 0 executed |
| … | Trig command for device n | … | command for device n executed |
| vPN_MGMT_OUTPUTS.IOD_CMD_HSK_Y[127] | Trig command for device 127 | vPN_MGMT_INPUTS.IOD_CMD_HSK_X[127] | command for device 127 executed |

## Example for Starting PROFINET Communication

If the data exchange mode for an IO device is set to 'automatic' (corresponding bit in IOD_MGT_MODE is 0), the cyclic data exchange with the device is automatically initiated, when the PROFINET Controller is started by setting IOC_START_STOP. If the device is however set to 'manual' mode, the data exchange between the PROFINET Controller and the device must be started separately by setting the bit in IOD_START_STOP_DEV, which corresponds to the device. The PROFINET Controller only evaluates a bit in IOD_START_STOP_DEV, if the equivalent bit in IOD_CMD_HSK_Y is set.

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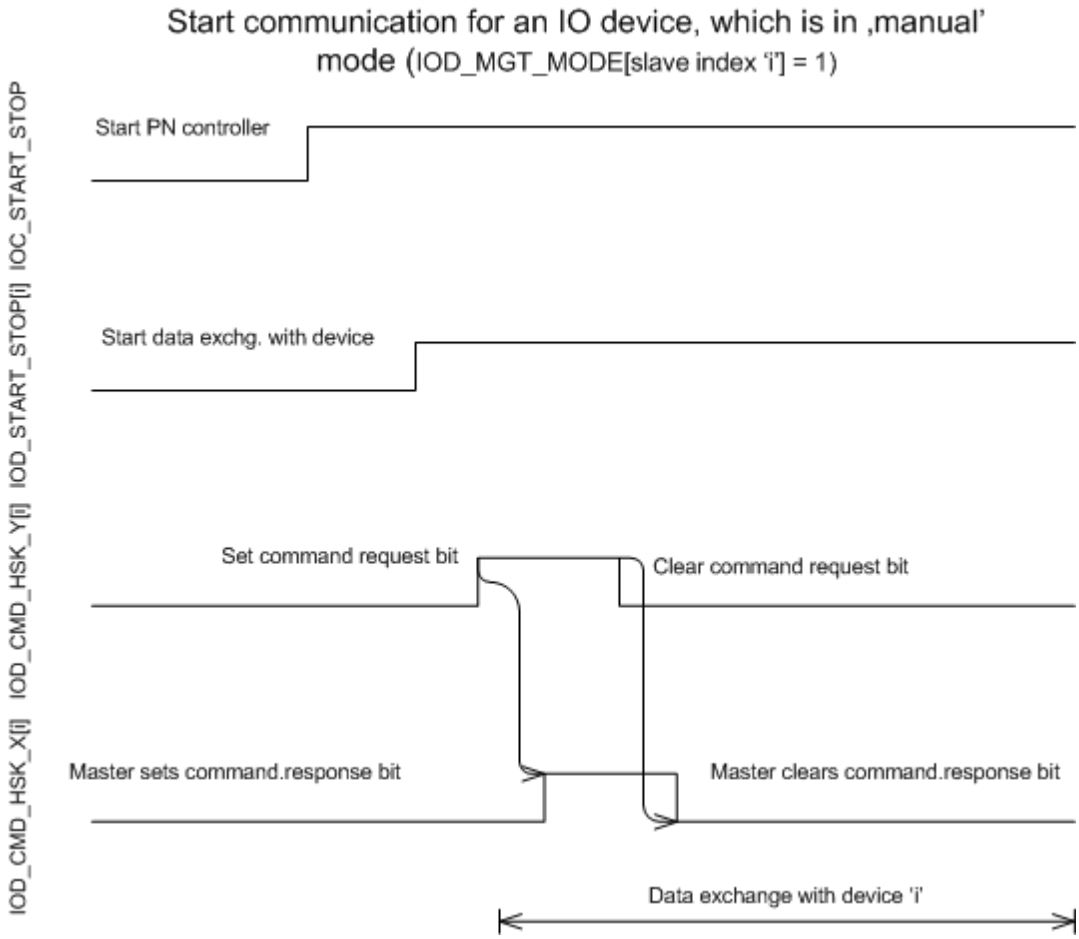
Start communication for an IO device, which is in ‚manual' mode (IOD_MGT_MODE[slave index 'i'] = 1)
IOD_CMD_HSK_X[i] IOD_CMD_HSK_Y[i] IOD_START_STOP[i] IOC_START_STOP
Start PN controller
Start data exchg. with device
Set command request bit
Clear command request bit
Master sets command.response bit
Master clears command.response bit
Data exchange with device 'i'

## 2.1.2 Cyclic Communication Area

### Process Data (Cyclic Data Exchange)

From the PROFINET perspective the cyclic communication is a continuous transfer of input and output data between the IO-controller and each IO-device without further interaction by the application. In PROFINET the cyclic communication is based on the producer/consumer model. For each IO-device, the IO-controller establishes connection with a specific refresh period (duration of the cycle). The cyclic data exchange can be individually started or stopped for each PROFINET IO-device.

Inputs and outputs are exchanged between the PLC and the PROFINET Controller via the INPUT_DATA and OUTPUT DATA buffers.

- I/O variables configured in GX Configurator-PN are located inside these two buffers by respecting some alignment rules.
- As these buffers can be accessed simultaneously from the PROFINET Controller and the PLC, a handshake mechanism exists to ensure consistency on all variables. This mechanism is optional and can be activated and deactivated per device.

### Input and Output Data Alignment

The IO-device input and output areas in the buffer memory of the PROFINET Controller are word-aligned. PROFINET variables are located in the shared memory by respecting the following rules

- The data of each PROFINET IO-device is placed at an address on a word boundary, independent of its type.
- Single or array variables must be aligned on an address modulo of the minimum of both the PLC alignment (2) and the native type size (1, 2 or 4). So specifically

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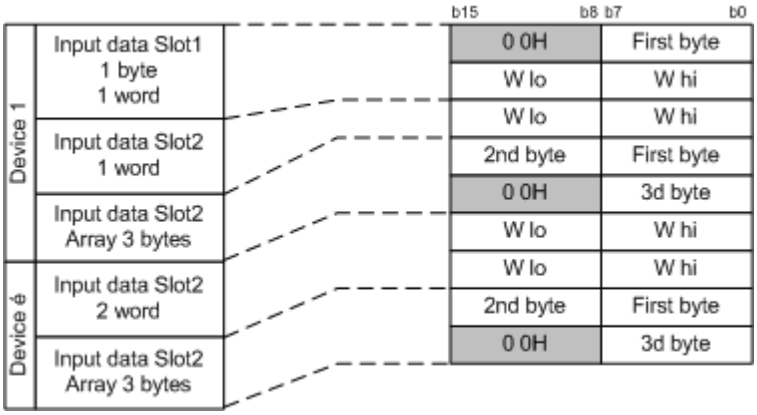
- Each slot should always be located at the next available word boundary address
- BYTEs or BYTE ARRAYS of the same slot are packed in memory to follow directly the previous defined variable
- WORDs should always be located at the next available word boundary address
- DWORDs, FLOATs should be also located at a word boundary address

Additionally all WORD, DWORD and FLOAT variables are stored in little-endian format in shared memory, to ease interpretation of the variables by the PLC program.

Example:




## IO-Device Consistency Management (IOD_CONSIST Registers)

The Q-series OS can ensure data consistency within a word in the data exchange via Autorefresh. The Autorefresh settings of the respective module contain a module specific X-device, which the communication module resets during access to the buffer memory. The CPU must check this device before accessing the buffer memory. If consistency handling has been disabled in the module, the device remains permanently set. The single X-device can only control access to the I/O data of all slaves together. An individual handshake for each station is not possible with this approach.

Using the following 128 bits the PLC can enable and disable at any time the consistency management per device.

| **From CPU to PROFINET IO-Controller** | | | |
|---|---|---|---|
| **Global Variable Identifiers** | **IO-Device Number** | **Values** | |
| | | **0 (default)** | **1** |
| vPN_MGMT_OUTPUTS.IOD_CONSIST[0]<br>…<br>vPN_MGMT_OUTPUTS.IOD_CONSIST[15] | 0<br>..<br>15 | Disable Consistency | Enable Consistency |
| vPN_MGMT_OUTPUTS.IOD_CONSIST[16]<br>…<br>vPN_MGMT_OUTPUTS.IOD_CONSIST[31] | 16<br>..<br>31 | | |
| … | … | | |
| vPN_MGMT_OUTPUTS.IOD_CONSIST[116]<br>… | 116<br>.. | | |

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| | | | |
|---|---|---|---|
| vPN_MGMT_OUTPUTS.IOD_CONSIST[127] | 127 | | |

Therefore station-specific handshake flags are added to the shared memory, which block simultaneous access to the same input or output area by both the master and the PLC program. This solution is slower, but has the following advantages:

1. IO-controller checks the configuration to detect stations, which require consistency
2. it marks those stations, which require consistency for inputs and outputs.
3. handshake controls access to each station separately, not blocking simultaneous access to all stations

The disadvantage of this solution is the delay between two updates data from PLC.

**Note**: PLC CPU and PROFINET Controller cannot write to the same area in shared memory. Therefore the handshake mechanism requires to define two bits for device inputs and two bits for device outputs.

## Output Handshake Registers (IOD_OUTPUT_HSK_Y and IOD_OUTPUT_HSK_X)

| From CPU to IO-Controller | |
|---|---|
| **Global Variable Identifier** | **Function** |
| vPN_MGMT_OUTPUTS.IOD_OUTPUT_HSK_Y[0] | Take into account new outputs for device 0 |
| … | Take into account new outputs for device n |
| vPN_MGMT_OUTPUTS.IOD_OUTPUT_HSK_Y[127] | Take into account new outputs for device 127 |

| From IO-Controller to CPU | |
|---|---|
| **Global Variable Identifier** | **Function** |
| vPN_MGMT_INPUTS.IOD_OUTPUT_HSK_X[0] | New Outputs read (will be sent to the IO-device 0 during next exchange) |
| … | New Outputs read (will be sent to the IO-device n during next exchange) |
| vPN_MGMT_INPUTS.IOD_OUTPUT_HSK_X[127] | New Outputs read (will be sent to the IO-device 127 during next exchange) |

## Input Handshake Registers (IOD_INPUT_HSK_Y and IOD_INPUT_HSK_X)

| From CPU to IO-Controller |
|---|

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| Global Variable Identifier | Function |
|---|---|
| vPN_MGMT_OUTPUTS.IOD_INPUT_HSK_Y[0] | New Inputs of the IO-device 0 has been read. |
| … | New Inputs of the IO-device n has been read. |
| vPN_MGMT_OUTPUTS.IOD_INPUT_HSK_Y[127] | New Inputs of the IO-device 127 has been read. |

| From IO-Controller to CPU | |
|---|---|
| **Global Variable Identifier** | **Function** |
| vPN_MGMT_INPUTS.IOD_INPUT_HSK_X[0] | Take in account new inputs from device 0 |
| … | Takes in account new input from device n |
| vPN_MGMT_INPUTS.IOD_INPUT_HSK_X[127] | Takes in account new input from device 127 |

**Note**: the ‘Input/output PLC-side flags’ are set and cleared by the PLC program, the ‘Input/output master-side flags’ are set and cleared by the master. In general write access is permitted to the input or output area of a station, if both flags are equal (0 ,0 or 1,1). Read access is permitted if both flags differ (0 ,1 or 1, 0).

### Access to Input Data

The following procedure must be followed, if the ‘Input consistency flag’ corresponding to the station is set.

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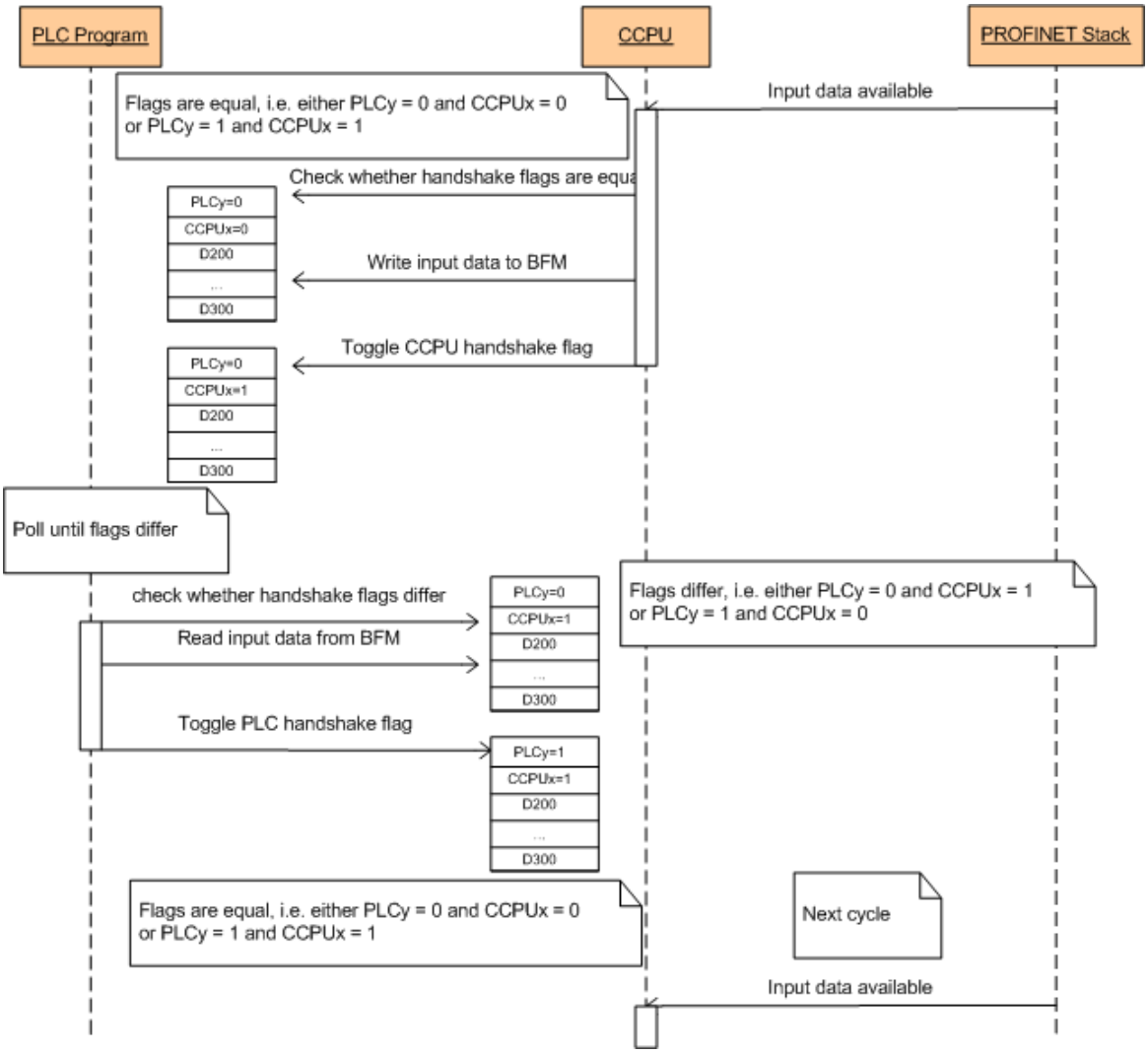


### Access to Output Data

The following procedure must be followed, if the 'Output consistency flag' corresponding to the station is set.

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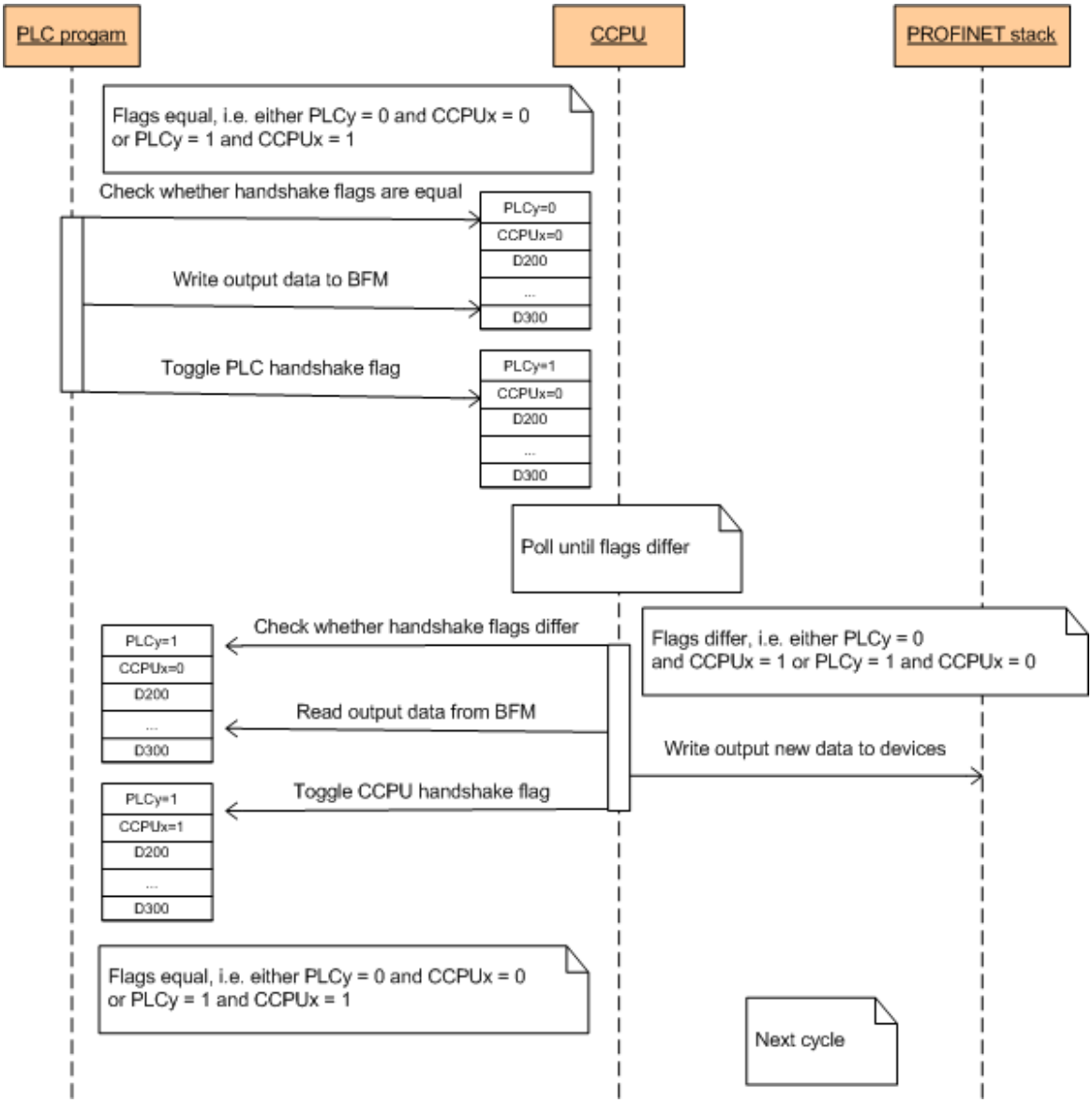


Cycle 1:

1. The PLC CPU detects that the output buffer is free because values of the handshake flags are equal (0:0 for cycle 1)
2. The PLC CPU writes the output data to the OUTPUT_DATA buffer
3. The PLC CPU toggles its handshake flag (0 -> 1 for cycle 1)
4. The PROFINET Controller detects that the values of the handshake flags are different
5. The PROFINET Controller reads the output data from the OUTPUT_DATA buffer
6. The PROFINET Controller signals that the output buffer is free by toggling its bit to equal the one of the PLC CPU (0 -> 1 for cycle 1)
7. The cycle 1 is completed

Cycle 2:

1. The PLC CPU detects that the output buffer is free (1:1 in handshake flags)
2. The PLC CPU writes the output data to buffer memory
3. The PLC CPU toggles its handshake flag (1 -> 0 for cycle 2)
4. The PROFINET Controller detects that the values of the handshake flags are different
5. The PROFINET Controller reads the output data from buffer memory
6. The PROFINET Controller signals that the output buffer is free by toggling its bit to equal that of the PLC CPU (1 -> 0 for cycle 2)

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7. The cycle 2 is completed

### 2.1.3 Acyclic Communication Area

The acyclic communication is an exchange of request and response messages between the PROFINET Controller and each IO-device station. The message exchange must be initiated by the controller.

#### Acyclic Request/Response Buffers

The shared memory area contains two pairs of buffers (vPN_ACYCLIC_REQ1/2 and vPN_ACYCLIC_RES1/2) allowing two acyclic requests to be performed simultaneously.:
- vPN_ACYCLIC_REQ1 and vPN_ACYCLIC_REQ2 allow PLC to deposit a request.
- vPN_ACYCLIC_RES1 and vPN_ACYCLIC_RES2 allows to get the respective answers

To manage synchronization, some handshake bits are used. A request buffer can be used to send a request to any of the configured stations; there is no relation between a request buffer and a particular station.

#### Acyclic Handshake Bits

Each request/response buffer pair is associated with a set of handshake bits.

| Global Variable Identifier | Description |
|---|---|
| vPN_MGMT_OUTPUTS.ACYC_HSK_Y_REQ1_EXECUTE | execution req. flag for buffer 1 |
| vPN_MGMT_OUTPUTS.ACYC_HSK_Y_REQ2_EXECUTE | execution req. flag for buffer 2 |
| vPN_MGMT_INPUTS.ACYC_HSK_X_RES1_COMPLETED | request in buffer 1 completed, response is in corresponding buffer |
| vPN_MGMT_INPUTS.ACYC_HSK_X_RES2_COMPLETED | request in buffer 2 completed, response is in corresponding buffer |
| vPN_MGMT_INPUTS.ACYC_HSK_X_RES1_ACCEPTED | request in buffer 1 accepted |
| vPN_MGMT_INPUTS.ACYC_HSK_X_RES2_ACCEPTED | request in buffer 2 accepted |

Once the response has been read by the PLC from the response buffer, the PLC must clear the ACYC_HSK_Y_REQ<n>_EXECUTE bit corresponding to the request. The PROFINET Controller will then clear the two corresponding bits ACYC_HSK_X_RES<n>_ACCEPTED and ACYC_HSK_X_RES<n>_COMPLETED.

The following diagram shows the request/response handshake between PLC program and the PROFINET Controller for acyclic communication.

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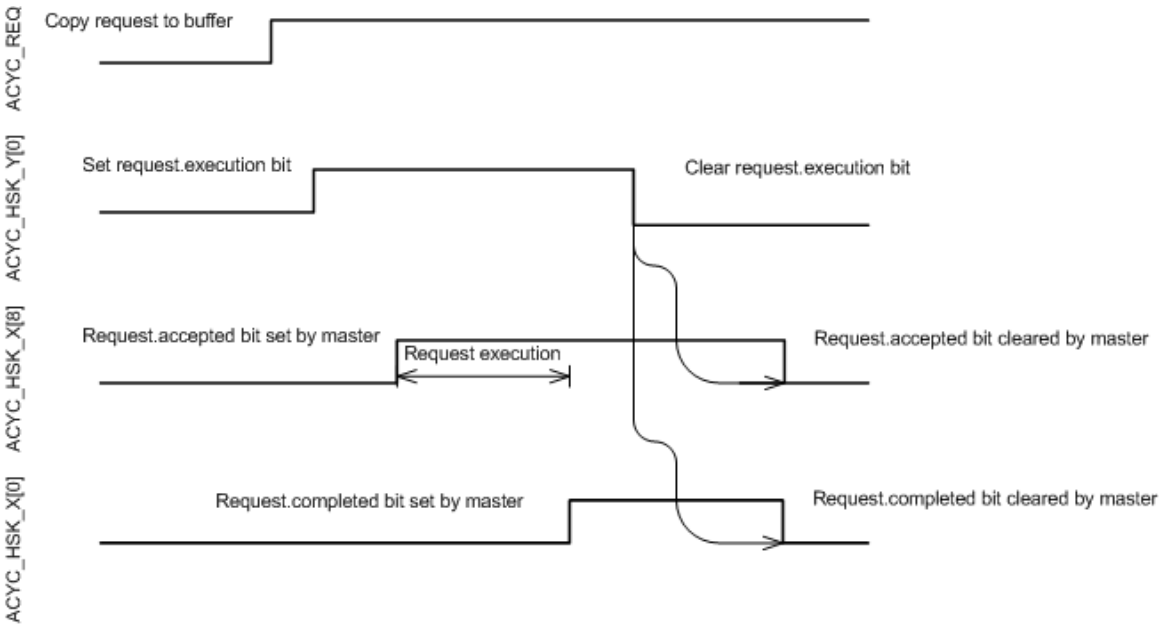


## Acyclic Request Header

The request buffer consists of an header and a data buffer area. The same header is used whatever is the requested service. Consult each service detailed description to verify which fields are relevant.

| Word Offset | ID | Description |
|---|---|---|
| 0 | RequestID | ID of the request |
| 1 | | |
| 2 | ServiceID | service identifier (see above) |
| 3 | Status | Status of the request. shall always be equal to 0x55. |
| 4 | DeviceID | IO-Device number defined in the GX Configurator PN, or in the case of implicit request, the IP address of the IO-device. |
| 5 | | |
| 6 | API | API number used to perform the Read<br>Value: 0 to 0xFFFFFFFF |
| 7 | | |
| 8 | SlotNumber | Target slot number.<br>Value: 0 to 0x7FFF |
| 9 | SubslotNumber | Target subslot numbe<br>Value: 1 to 0x8FFF |
| 10 | Index | Index in the slot or sub-slot<br>Value: 1 to 0xFFFF |
| 11 | Data length (byte) | Number of bytes stored in the request data buffer |

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| | | |
|---|---|---|
| | | Value: 0 to 1440. |
| 12 | PnDeviceID | PROFINET Device ID |
| 13 | PnVendorID | PROFINET Vendor ID |
| 14-21 | ARUUID | Never used, must be set to 0. |
| 22-29 | Reserved | Reserved |

**Note**: Each value is in little-endian- (i.e. Intel-) format.

## Acyclic Response Header

The response buffer consists of a header and a data buffer area. The same header is used independently of the requested service. Consult each service detailed description to verify, which fields are relevant.

| Word Offset | ID | Description |
|---|---|---|
| 0 | RequestID | ID of the request |
| 1 | | |
| 2 | ServiceID | service identifier (see above) |
| 3 | Status | Status of the Request |
| 4 | DeviceID | IO-device number defined in GX Configurator-PN or in the case of explicit request, the IP address of the IO-device. |
| 5 | | |
| 6 | Data length | Number of bytes stored in the response data buffer |
| 7 | ErrorDecode | PROFINET value. Used when a negative response is returned |
| 8 | ErrorCode1 | PROFINET value. Used when a negative response is returned |
| 9 | ErrorCode2 | PROFINET value. Used when a negative response is returned |
| 10-19 | reserved | Reserved |

**Note**: Each value is in little-endian- (i.e. Intel-) format.

### RequestID

The RequestID field in the request buffer header can be used by PLC to identify the answer. It is the responsibility of the PLC program to manage the field RequestID. The best practice is to increment this field before each new request. The PROFINET firmware will answer to the request with the same RequestID.

### ServiceID

The field 'ServiceID' marks the type of request. Acyclic communication can be used for the following

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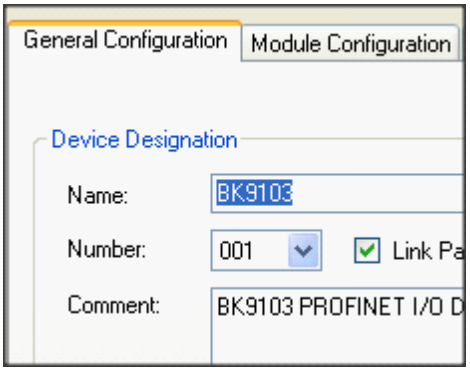
services:

| Service | Identifier | Description |
|---|---|---|
| Network detection | 0x01 | determines the number of connected IO devices (see 'Network Detection Service') |
| IO-Device Detected | 0x02 | |
| Read Implicit | 0x03 | see 'Record Block Implicit Read' |
| Write Explicit | 0x04 | see 'Record Block Explicit Write' |
| Read Explicit | 0x05 | see 'Record Block Explicit Read' |
| Alarm Request | 0x06 | see 'Alarm Request' |
| Alarm Ack | 0x07 | see 'Alarm Ack' |
| IO-Device Information | 0x08 | get information for a specific IO device |
| Read alarm log | 0x09 | see 'Alarm Log' |

### DeviceID

This ID is defined during PROFINET configuration with the GX Configurator PN tool.




## Acyclic Service Request/Response Formats

### Network Detection Service

Based on DCP identify request, this service allows to detect up to 255 IO-devices present on the network (LAN). This function returns only the number of IO-Devices detected. After the call of this service, it is needed to call the service IO-Device detected (serviceID = 2) to get more information on each detected IO-Device.

Request Format

| Word Offset | ID | Value |
|---|---|---|
| 0 | RequestID | PLC value |

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| | | |
|---|---|---|
| 1 | | |
| 2 | ServiceID | 0x01 |
| 3 | Status | 0x55 |
| 4 | DeviceID | 0x0000 |
| 5 | | |
| 6 | API | 0x0000 |
| 7 | | |
| 8 | SlotNumber | 0x00 |
| 9 | SubslotNumber | 0x00 |
| 10 | Index | 0x00 |
| 11 | Data length (byte) | 0x0000 |
| 12 | PnDeviceID | 0x00 |
| 13 | PnVendorID | 0x00 |
| 14-21 | ARUUID | 0x00 |
| 22-29 | Reserved | Reserved (0x00) |

Response Positive Format (Status = 0)

| | Word Offset | ID | Value |
|---|---|---|---|
| **Header** | 0 | RequestID | Same as the request |
| | 1 | | |
| | 2 | ServiceID | 0x01 |
| | 3 | Status | 0x00 |
| | 4 | DeviceID | 0x0000 |
| | 5 | | |
| | 6 | Data length (byte) | 0x0004 |
| | 7 | ErrorDecode | 0x00 |
| | 8 | ErrorCode1 | 0x00 |

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| | | | |
|---|---|---|---|
| | 9 | ErrorCode2 | 0x00 |
| | 10-19 | reserved | 0x00 |
| **Data** | 20 | Nb IO-Devices | Number of IO-devices detected |
| | 21 | | |

Response Negative Format

| | Word Offset | ID | Value |
|---|---|---|---|
| **Header** | 0 | RequestID | Same as the request |
| | 1 | | |
| | 2 | ServiceID | 0x01 |
| | 3 | Status | != 0x00 |
| | 4 | DeviceID | 0x00 |
| | 5 | | |
| | 6 | Data length | 0x0000 |
| | 7 | ErrorDecode | != 0x00 |
| | 8 | ErrorCode1 | != 0x00 |
| | 9 | ErrorCode2 | != 0x00 |
| | 10-19 | reserved | 0x00 |

Possible values for Status

| Value | Comment |
|---|---|
| 0 | Status OK |
| 1 | Profinet stack not started |
| 2 | No ethernet link |
| 3 | No IO-Device detected |

**Note**: if more than 255 devices are detected, the function returns status OK and NbIO Devices ==255

### IO-Device Detection

This function allows to get ,for each IO-Device detected by a previous call to the service Network Detection, some information like IP configuration, MAC Address, Vendor ID, Device ID, Name of the

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IO-Device and IO-Device type.

Request format

| Word Offset | ID | Value |
|---|---|---|
| 0 | RequestID | PLC value |
| 1 | | |
| 2 | ServiceID | 0x02 |
| 3 | Status | 0x55 |
| 4 | DeviceID | 0x0000 |
| 5 | | |
| 6 | API | 0x0000 |
| 7 | | |
| 8 | slot_number | 0x00 |
| 9 | Subslot_number | 0x00 |
| 10 | Index | 0x00 |
| 11 | Data length (byte) | 0x00 |
| 12 | PnDeviceID | 0x00 |
| 13 | PnVendorID | 0x00 |
| 14-21 | ARUUID | 0x00 |
| 22-29 | Reserved | Reserved (0x00) |

Response Positive Format (Status = 0)

| | Word Offset | ID | Value |
|---|---|---|---|
| Header | 0 | RequestID | Same as the request |
| | 1 | | |
| | 2 | ServiceID | 0x02 |
| | 3 | Status | 0x00 |
| | 4 | DeviceID | 0x0000 |

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| | | | |
|---|---|---|---|
| | 5 | | |
| | 6 | Data length (byte) | Size of the Data. |
| | 7 | ErrorDecode | 0x00 |
| | 8 | ErrorCode1 | 0x00 |
| | 9 | ErrorCode2 | 0x00 |
| | 10-19 | reserved | 0x00 |
| **Data** | 20 | VendorID | VendorID of the device |
| | 21 | DeviceID | DeviceID of the device |
| | 22 | IP address | IP address of the Device |
| | 23 | | |
| | 24 | Subnetmask | Subnet mask of the Device |
| | 25 | | |
| | 26 | Gateway | Gateway IP Address of the Device |
| | 27 | | |
| | 28 – 30 | Mac address | Mac Address of the Device |
| | 31 | SizeName | Size name of the device (240 bytes max) |
| | 32 - SizeName | DeviceName | Name of the device |
| | XX | SizeType | Size of “Type” field (max size : 25 byte) |
| | Xx+1 – SizeType | Type | Type of Device |

Response Negative Format

| | **Word Offset** | **ID** | **Value** |
|---|---|---|---|
| **Header** | 0 | RequestID | Same as the request |
| | 1 | | |
| | 2 | ServiceID | 0x02 |
| | 3 | Status | != 0x00 |

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| | | | |
|---|---|---|---|
| | 4 | DeviceID | 0x0000 |
| | 5 | | |
| | 6 | Data length (byte) | 0x00 |
| | 7 | ErrorDecode | != 0x00 |
| | 8 | ErrorCode1 | != 0x00 |
| | 9 | ErrorCode2 | != 0x00 |
| | 10-19 | Reserved | 0x00 |

Possible Values for Status

| Value | Comment |
|---|---|
| 0 | Status OK |
| 1 | Profinet stack not started |
| 4 | Reception buffer too small (stack internal error) |
| 5 | No more IO-Device |
| 6 | “Network detection” service never called. |

Network Detection Scenario

First, the Network detection service has to be called. This function will return the number of IO-devices (NbIOD) detected on the LAN. After, IO-Device Detection service should be called Nb IO Device times or until the returned status equal to 0. A status 5 is returned when all detected IO-devices have already been requested by the service IO-Device Detection

**Note**: IO-devices are returned in the same order in which they answered to the DCP identify request. Two consecutive calls to network detection can result in two different lists.

### Record Block Implicit Read (non connected)

Request format

| Word Offset | ID | Value |
|---|---|---|
| 0 | RequestID | PLC value |
| 1 | | |
| 2 | ServiceID | 3 |
| 3 | Status | 0x55 |
| 4 | DeviceID | Shall contain the IP address |

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| | | |
|---|---|---|
| 5 | | |
| 6 | API | API number used to perform the read |
| 7 | | |
| 8 | SlotNumber | Slot number targeted |
| 9 | SubslotNumber | Sub-slot number targeted |
| 10 | Index | Index of the record block |
| 11 | Data length (byte) | 0 |
| 12 | PnDeviceID | DeviceID of the IO-Device |
| 13 | PnVendorID | VendorID of the IO-Device |
| 14-21 | ARUUID | 0 |
| 22-29 | Reserved | Reserved (0) |

Response Positive Format (Status = 0)

| | Word Offset | ID | Value |
|---|---|---|---|
| **Header** | 0 | RequestID | Same as the request |
| | 1 | | |
| | 2 | ServiceID | 0x03 |
| | 3 | Status | 0x00 |
| | 4 | DeviceID | Requested device |
| | 5 | | |
| | 6 | Data length (byte) | Buffer data size |
| | 7 | ErrorDecode | 0x00 |
| | 8 | ErrorCode1 | 0x00 |
| | 9 | ErrorCode2 | 0x00 |
| | 10-19 | reserved | 0x00 |
| **Data** | 20 | .. | Data |
| | .. | | |
| | .. | | |

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| | | | |
|---|---|---|---|
| | .. | | |
| | .. | | |
| | .. | | |

Response Negative Format

| | Word Offset | ID | Value |
|---|---|---|---|
| **Header** | 0 | Request ID | Same as the request |
| | 1 | | |
| | 2 | ServiceID | 3 |
| | 3 | Status | != 0 |
| | 4 | Device ID | 0 |
| | 5 | | |
| | 6 | Data length (byte) | 0 |
| | 7 | ErrorDecode | != 0 |
| | 8 | ErrorCode1 | != 0 |
| | 9 | ErrorCode2 | != 0 |
| | 10-19 | reserved | 0 |

Possible Values for Status

| Value | Comment |
|---|---|
| 0 | Status OK, function |
| 1 | Profinet stack not started |
| 2 | No ethernet link |
| 3 | No IO-Device detected |
| 4 | Reception buffer too small (internal stack error) |
| 6 | Device not connected |
| 7 | Device not configured |
| 8 | Profinet error |

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### Record Block Explicit Write (connected)

Request format

| Word Offset | ID | Value |
|---|---|---|
| 0 | RequestID | PLC value |
| 1 | | |
| 2 | ServiceID | 4 |
| 3 | Status | 0x55 |
| 4 | DeviceID | Requested device |
| 5 | | |
| 6 | API | API number used to perform the write |
| 7 | | |
| 8 | SlotNumber | Slot number targeted |
| 9 | SubslotNumber | Subslot number targeted |
| 10 | Index | Index of the record block |
| 11 | Data length (byte) | data size |
| 12 | PnDeviceID | 0 |
| 13 | PnVendorID | 0 |
| 14-21 | ARUUID | 0 |
| 22-29 | Reserved | Reserved (0) |
| 30.. | data | data |

Response positive format (Status = 0)

| | Word Offset | ID | Value |
|---|---|---|---|
| **Header** | 0 | RequestID | Same as the request |
| | 1 | | |
| | 2 | ServiceID | 0x03 |

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| | | | |
|---|---|---|---|
| | 3 | Status | 0x00 |
| | 4 | DeviceID | Requested Device |
| | 5 | | |
| | 6 | Data length (byte) | 0 |
| | 7 | ErrorDecode | 0x00 |
| | 8 | ErrorCode1 | 0x00 |
| | 9 | ErrorCode2 | 0x00 |
| | 10-19 | reserved | 0x00 |

Response Negative Format

| | Word Offset | ID | Value |
|---|---|---|---|
| **Header** | 0 | RequestID | Same as the request |
| | 1 | | |
| | 2 | ServiceID | 0x04 |
| | 3 | Status | != 0x00 |
| | 4 | DeviceID | 0x00 |
| | 5 | | |
| | 6 | Data length (byte) | 0x00 |
| | 7 | ErrorDecode | != 0x00 |
| | 8 | ErrorCode1 | != 0x00 |
| | 9 | ErrorCode2 | != 0x00 |
| | 10-19 | reserved | 0x00 |

Possible Values for Status

| Value | Comment |
|---|---|
| 0 | Status OK, function |
| 1 | Profinet stack not started |
| 2 | No ethernet link |

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| | |
|---|---|
| 3 | No IO-Device detected |
| 6 | Device not connected |
| 7 | Device not configured |
| 8 | Profinet error see others status |

### Record Block Explicit Read (connected)

Request format

| Word Offset | ID | Value |
|---|---|---|
| 0 | RequestID | PLC value |
| 1 | | |
| 2 | ServiceID | 0x05 |
| 3 | Status | 0x55 |
| 4 | DeviceID | Requested device |
| 5 | | |
| 6 | API | API number used to perform the read |
| 7 | | |
| 8 | SlotNumber | Slot number targeted |
| 9 | SubslotNumber | Subslot number targeted |
| 10 | Index | Index of the record block |
| 11 | Data length (byte) | 0 |
| 12 | PnDeviceID | 0x00 |
| 13 | PnVendorID | 0x00 |
| 14-21 | ARUUID | 0x00 |
| 22-29 | Reserved | Reserved (0x00) |

Response positive format (Status = 0)

| | Word Offset | ID | Value |
|---|---|---|---|
| **Header** | 0 | Request ID | Same as the request |

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| | | | |
|---|---|---|---|
| | 1 | | |
| | 2 | ServiceID | 0x05 |
| | 3 | Status | 0x00 |
| | 4 | Device ID | IP address |
| | 5 | | |
| | 6 | Data length (byte) | Buffer data size |
| | 7 | ErrorDecode | 0x00 |
| | 8 | ErrorCode1 | 0x00 |
| | 9 | ErrorCode2 | 0x00 |
| | 10-19 | Reserved | 0x00 |
| **Data** | 20 | | Data |
| | … | | |
| | | | |
| | | | |
| | | | |
| | | | |

Response Negative Format

| | **Word Offset** | **ID** | **Value** |
|---|---|---|---|
| **Header** | 0 | RequestID | Same as the request |
| | 1 | | |
| | 2 | ServiceID | 0x05 |
| | 3 | Status | != 0x00 |
| | 4 | DeviceID | 0x00 |
| | 5 | | |
| | 6 | Data length (byte) | 0x00 |
| | 7 | ErrorDecode | != 0x00 |

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| | | | |
|---|---|---|---|
| | 8 | ErrorCode1 | != 0x00 |
| | 9 | ErrorCode2 | != 0x00 |
| | 10-19 | reserved | 0x00 |

Possible values for Status

| Value | Comment |
|---|---|
| 0 | Status OK, function |
| 1 | Profinet stack not started |
| 2 | No ethernet link |
| 3 | No IO-Device detected |
| 4 | Reception buffer too small (internal stack error) |
| 8 | Profinet error see others status |

### Alarm Request

This service allows PLC to ask to PROFINET stack the alarm received from a specific IO-Device. This service has to be used in relation with the IOD_MGT_ALARM and IOD_ALARM_IND Alarm registers see 3.1.6.

Request Format

| Word Offset | ID | Value |
|---|---|---|
| 0 | RequestID | PLC value |
| 1 | | |
| 2 | ServiceID | 0x06 |
| 3 | Status | 0x55 |
| 4 | DeviceID | Requested Device |
| 5 | | |
| 6 | API | 0x00 |
| 7 | | |
| 8 | SlotNumber | 0x00 |
| 9 | SubslotNumber | 0x00 |
| 10 | Index | 0x00 |
| 11 | Data length (byte) | 0x00 |
| 12 | PnDeviceID | 0x00 |
| 13 | PnVendorID | 0x00 |
| 14-21 | ARUUID | 0x00 |

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| | | |
|---|---|---|
| 22-29 | Reserved | Reserved (0x00) |

Response Positive Format (Status = 0)

| | Word Offset | ID | Value |
|---|---|---|---|
| **Header** | 0 | RequestID | Same as the request |
| | 1 | | |
| | 2 | ServiceID | 0x06 |
| | 3 | Status | 0x00 |
| | 4 | DeviceID | Requested Device |
| | 5 | | |
| | 6 | Data length (byte) | Data size |
| | 7 | ErrorDecode | 0x00 |
| | 8 | ErrorCode1 | 0x00 |
| | 9 | ErrorCode2 | 0x00 |
| | 10-19 | reserved | 0x00 |
| **Data** | 20 | API | API number used to perform the alarm |
| | 21 | | |
| | 22 | Priority | Alarm priority |
| | 23 | Type | Alarm type |
| | 24 | Slot number | Slot number of the alarm |
| | 25 | SubSlot number | Subslot number of the alarm |
| | 26 | Specifier | Alarm specifier |
| | 27 | Module ident number | Module ID of the Alarm |
| | 28 | | |
| | 29 | SubModule ident number | submodule ID of the Alarm |
| | 30 | | |
| | 31 | Data length | Data Size in byte |
| | Data | Data | 0 to 1432 bytes |

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Alarm priority:
- High priority : 0x06
- Low priority: 0x05

Alarm Type:

| Value (hexadecimal) | Meaning |
|---|---|
| 0x0000 | Reserved |
| 0x0001 | Diagnosis |
| 0x0002 | Process |
| 0x0003 | Pull |
| 0x0004 | Plug |
| 0x0005 | Status |
| 0x0006 | Update |
| 0x0007 | Media Redundancy |
| 0x0008 | Controlled by supervisor. Logical “Pull” of a submodule to withdraw ownership |
| 0x0009 | Released. Logical “Plug” of a submodule to return ownership or trigger a reparameterization |
| 0x000A | Plug Wrong Submodule |
| 0x000B | Return of Submodule |
| 0x000C | Diagnosis disappears |
| 0x000D | Multicast communication mismatch notification |
| 0x000E | Port data change notification |
| 0x000F | Sync data changed notification |
| 0x0010 | Isochronous mode problem notification |
| 0x0011 | Network component problem notification |
| 0x0012 | Time data changed notification |
| 0x0013 | Dynamic Frame Packing problem notification |
| 0x0014 | MRPD problem notification |
| 0x0015 | System Redundancy |
| 0x0016 – 0x001D | Reserved |
| 0x001E | Upload and retrieval notification |
| 0x001F | Pull module |
| 0x0020 – 0x007F | Manufacturer specific |

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| Value (hexadecimal) | Meaning |
|---|---|
| 0x0080 – 0x00FF | Reserved for profiles |
| 0x0100 – 0xFFFF | Reserved |

Alarm specifier: coding of bit fields is shown below:

| bits | Description | Value |
|---|---|---|
| 0-10 | Sequence number | 0 to 2,047, incremented upon each indication |
| 11 | Diagnostis channel | 0x00: No diagnosis available<br>0x01: Diagnosis available |
| 12 | Specific diagnosis | 0x00: No diagnosis available<br>0x01: Diagnosis available |
| 13 | Diagnostis sub-module | 0x00: No diagnosis available<br>0x01: Diagnosis available |
| 14 | Reserved | 0x00 |
| 15 | AR diagnostis | 0x00: No diagnosis available<br>0x01: Diagnosis available |

Response Negative Format

| | Word Offset | ID | Value |
|---|---|---|---|
| **Header** | 0 | Request ID | Same as the request |
| | 1 | | |
| | 2 | ServiceID | 0x06 |
| | 3 | Status | != 0x00 |
| | 4 | Device ID | 0x00 |
| | 5 | | |
| | 6 | Data length (byte) | 0x00 |
| | 7 | ErrorDecode | != 0x00 |
| | 8 | ErrorCode1 | != 0x00 |

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| | | | |
|---|---|---|---|
| | 9 | ErrorCode2 | != 0x00 |
| | 10-19 | reserved | 0x00 |

Possible values for Status

| Value | Comment |
|---|---|
| 0 | Status OK |
| 1 | Profinet stack not started |
| 7 | Device not configured |
| 8 | Profinet error see others status |
| 9 | No Alarm for this device |

### Alarm Ack

This service sends to the IO-Device the Ack alarm frame. This service has to be used in relation with the IOD_MGT_ALARM and IOD_ALARM_IND Alarm registers.

Request Format

| Word Offset | ID | Value |
|---|---|---|
| 0 | RequestID | PLC value |
| 1 | | |
| 2 | ServiceID | 0x07 |
| 3 | Status | 0x55 |
| 4 | DeviceID | Requested device |
| 5 | | |
| 6 | API | API number used to perform the ACK |
| 7 | | |
| 8 | SlotNumber | Slot number targeted |
| 9 | SubslotNumber | Subslot number targeted |
| 10 | Index | has to be contain the alarm priority . |
| 11 | Data length (byte) | 0x00 |
| 12 | PnDeviceID | 0x00 |

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| | | |
|---|---|---|
| 13 | PnVendorID | 0x00 |
| 14-21 | ARUUID | 0x00 |
| 22-29 | Reserved | Reserved (0x00) |

Response positive format (Status = 0)

| | Word Offset | ID | Value |
|---|---|---|---|
| **Header** | 0 | Request ID | Same as the request |
| | 1 | | |
| | 2 | ServiceID | 0x07 |
| | 3 | Status | 0x00 |
| | 4 | Device ID | Requested device |
| | 5 | | |
| | 6 | Data length (byte) | 0x00 |
| | 7 | ErrorDecode | 0x00 |
| | 8 | ErrorCode1 | 0x00 |
| | 9 | ErrorCode2 | 0x00 |
| | 10-19 | reserved | 0x00 |

Response negative format

| | Word Offset | ID | Value |
|---|---|---|---|
| **Header** | 0 | RequestID | Same as the request |
| | 1 | | |
| | 2 | ServiceID | 0x07 |
| | 3 | Status | != 0x00 |
| | 4 | DeviceID | 0x00 |
| | 5 | | |
| | 6 | Data length (byte) | 0x00 |

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| | | | |
|---|---|---|---|
| | 7 | ErrorDecode | != 0x00 |
| | 8 | ErrorCode1 | != 0x00 |
| | 9 | ErrorCode2 | != 0x00 |
| | 10-19 | reserved | 0x00 |

Possible values for Status

| Value | Comment |
|---|---|
| 0 | Status OK |
| 1 | Profinet stack not started |
| 7 | Device not configured |
| 8 | Profinet error see others status |
| 9 | No alarm for this device |

### IO-Device Information

Request format

| Word Offset | ID | Value |
|---|---|---|
| 0 | RequestID | PLC value |
| 1 | | |
| 2 | ServiceID | 0x08 |
| 3 | Status | 0x55 |
| 4 | DeviceID | Requested device |
| 5 | | |
| 6 | API | 0x00 |
| 7 | | |
| 8 | SlotNumber | 0x00 |
| 9 | Subslot Number | 0x00 |
| 10 | Index | 0x00 |
| 11 | Data length (byte) | 0x00 |
| 12 | PnDeviceID | 0x00 |

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| | | |
|---|---|---|
| 13 | PnVendorID | 0x00 |
| 14-21 | ARUUID | 0x00 |
| 22-29 | Reserved | Reserved (0x00) |

Response positive format (Status = 0)

| | Word Offset | ID | Value |
|---|---|---|---|
| **Header** | 0 | Request ID | Same as the request |
| | 1 | | |
| | 2 | ServiceID | 0x08 |
| | 3 | Status | 0x00 |
| | 4 | Device ID | Requested Device |
| | 5 | | |
| | 6 | Data length (byte) | 0x24 |
| | 7 | ErrorDecode | 0x00 |
| | 8 | ErrorCode1 | 0x00 |
| | 9 | ErrorCode2 | 0x00 |
| | 10-19 | reserved | 0x00 |
| **Data** | 20 | | Mac address |
| | 21 | | |
| | 22 | | |
| | 23 | | IP address |
| | 24 | | |
| | 25 | | Input @ area in High Speed Area |
| | 26 | | |
| | 27 | | output @ area in High Speed Area |
| | 28 | | |
| | 29 | | Input length |
| | 30 | | Output Length |

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| | | | |
|---|---|---|---|
| | 31 | | Refresh period |
| | 32 | | Number of successul connections |
| | 33 | | Number of disconnections |
| | 34 | | State (Connected/Not Connected) |
| | 35 | | Management (Manual Automatic) |
| | 36 | | Current Profinet Status |
| | 37 | | |

Response negative format

| | Word Offset | ID | Value |
|---|---|---|---|
| **Header** | 0 | Request ID | Same as the request |
| | 1 | | |
| | 2 | ServiceID | 8 |
| | 3 | Status | != 0 |
| | 4 | Device ID | 0 |
| | 5 | | |
| | 6 | Data length (byte) | 0 |
| | 7 | ErrorDecode | != 0 |
| | 8 | ErrorCode1 | != 0 |
| | 9 | ErrorCode2 | != 0 |
| | 10-19 | reserved | 0 |

Possible values for Status

| Value | Comment |
|---|---|
| 0 | Status OK, function |
| 1 | Profinet stack not started |
| 10 | Bad Device ID (Device not configured) |

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### Alarm Log

This request allow to get an alarm description from the internal alarm log
- Function has to be called several times to get several alarm description
- The older alarm is returned first

Request format

| Word Offset | ID | Value |
|---|---|---|
| 0 | RequestID | PLC value |
| 1 | | |
| 2 | ServiceID | 0x09 |
| 3 | Status | 0x55 |
| 4 | DeviceID | Requested device |
| 5 | | |
| 6 | API | 0 |
| 7 | | |
| 8 | SlotNumber | 0 |
| 9 | SubslotNumber | 0 |
| 10 | Index | 0 |
| 11 | Data length (byte) | 0 |
| 12 | PnDeviceID | 0 |
| 13 | PnVendorID | 0 |
| 14-21 | ARUUID | 0 |
| 22-29 | Reserved | Reserved (0) |

Response positive format (Status = 0)

| | Word Offset | ID | Value |
|---|---|---|---|
| Header | 0 | RequestID | Same as the request |
| | 1 | | |
| | 2 | ServiceID | 0x09 |

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| | | | |
|---|---|---|---|
| | 3 | Status | 0x00 |
| | 4 | DeviceID | Requested Device |
| | 5 | | |
| | 6 | Data length (byte) | 0 |
| | 7 | ErrorDecode | 0x00 |
| | 8 | ErrorCode1 | 0x00 |
| | 9 | ErrorCode2 | 0x00 |
| | 10-19 | reserved | 0x00 |
| **Data** | 20 | Date | Date of the PROFINET Controller when the frame has been received |
| | 21 | | |
| | 22 | Time | Time of the PROFINET Controller when the frame has been received |
| | 23 | | |
| | 24 | Alarm Type | |
| | 25 | API | API number used to perform the alarm |
| | 26 | | |
| | 27 | Alarm Priority | |
| | 28 | ModuleID | ID of the module. Manufacturer dependant. |
| | 29 | | |
| | 30 | SubModuleID | ID of the module. Manufacturer dependant. |
| | 31 | | |
| | 32 | Slot | Slot number of the alarm |
| | 33 | SubSlot | Subslot number of the alarm |
| | 34 | Alarm specifier | |

Response negative format

| | **Word Offset** | **ID** | **Value** |
|---|---|---|---|
| **Header** | 0 | RequestID | Same as the request |
| | 1 | | |

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| | | | |
|---|---|---|---|
| | 2 | ServiceID | 0x09 |
| | 3 | Status | != 0x00 |
| | 4 | DeviceID | 0x00 |
| | 5 | | |
| | 6 | Data length (byte) | 0x00 |
| | 7 | ErrorDecode | != 0x00 |
| | 8 | ErrorCode1 | != 0x00 |
| | 9 | ErrorCode2 | != 0x00 |
| | 10-19 | reserved | 0x00 |

Possible values for Status

| Value | Comment |
|---|---|
| 0 | Status OK, function |
| 1 | PROFINET stack not started |
| 2 | No ethernet link |
| 7 | Device not configured |
| 8 | PROFINET error see others status |
| 9 | No alarm in log |

## Alarm Management

A IO-device is able to send alarms to the IO-controller. When a alarm is received, the IO-controller is expected to get the alarm description, then to acknowledge the alarm.
An IO-device can send up to 2 alarms simultaneously:
- one alarm of High Priority
- one alarm of low priority.

The IO-device won't be able to initiate a new alarm of the respective priority as long as the IO-controller has not "acknowledge" the previous one

By default, the PROFINET stack can handle alarm automatically without reporting any indication to the PLC program. However, PLC can decide to manage or not by itself alarms for each device. This can be done using the IOD_MGT_ALARM registers. With these eight 16bit registers the PLC can indicate, how the firmware should for each IO-device manage alarms.

| From CPU to PROFINET IO-Controller | | |
|---|---|---|
| **Global Variable Identifier** | **IO-Device** | **Values** |

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| | | 0 | 1 |
|---|---|---|---|
| vPN_MGMT_OUTPUTS.IOD_MGT_ALARM[0]<br>…<br>vPN_MGMT_OUTPUTS.IOD_MGT_ALARM[15] | 0<br>..<br>15 | Automatic<br>..<br>Automatic | Manual<br>..<br>Manual |
| vPN_MGMT_OUTPUTS.IOD_MGT_ALARM[16]<br>…<br>vPN_MGMT_OUTPUTS.IOD_MGT_ALARM[31] | 16<br>..<br>31 | Automatic<br>..<br>Automatic | Manual<br>..<br>Manual |
| … | … | …. | …. |
| vPN_MGMT_OUTPUTS.IOD_MGT_ALARM[116]<br>…<br>vPN_MGMT_OUTPUTS.IOD_MGT_ALARM[127] | 116<br>..<br>127 | Automatic<br>..<br>Automatic | Manual<br>..<br>Manual |

For an IO-device in automatic mode the IO-controller automatically acknowledges each alarm received from an IO-device (IOD_ALARM_IND bits are not used). For an IO-device in manual mode an alarm indication is signalled to the PLC program via the IOD_ALARM_IND registers.

| From IO-Controller to CPU | |
|---|---|
| **Register** | **Function** |
| vPN_MGMT_INPUTS.IOD_ALARM_IND[0] | Alarm has been received from the device 0 |
| … | Alarm has been received from the device n |
| vPN_MGMT_INPUTS.IOD_ALARM_IND[127] | Alarm has been received from the device 127 |

**Note**: the stack can store internally both high and low priority alarms. When the CPU requests alarms, the high priority alarm will be returned first. The IOD_ALARM_IND bit for the corresponding device will be reset only after the management of both alarms.

The following diagram demonstrates an alarm cycle (when alarm management is activated by the PLC program).

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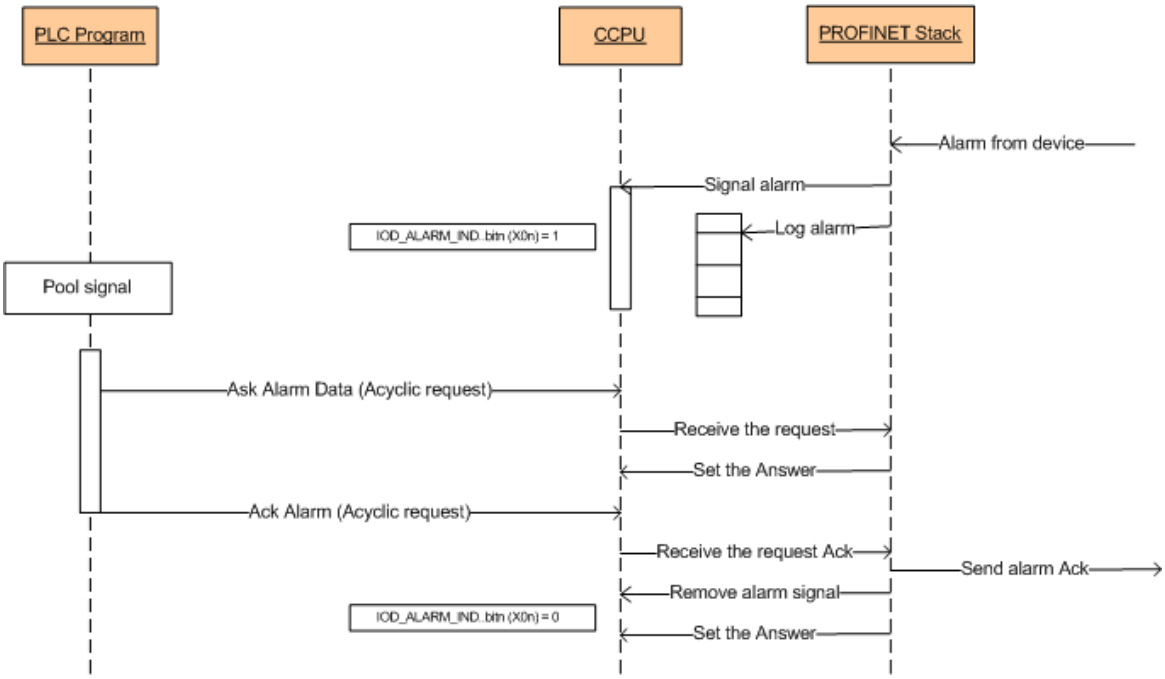


**Note**: a ring buffer exists for each device. This ring buffer stores up to seven alarms for each IO-device. Each incoming alarm is logged in this ring log buffer, from which the PLC can read using acyclic requests.

## 2.1.4 Network Diagnostics

### PROFINET IO Controller Status

The bits in these two words provide information on the IO-controller stack state.

| From PROFINET IO-Controller to CPU | | |
|---|---|---|
| **Global Variable Identifier** | **Values** | |
| | **0** | **1** |
| vPN_MGMT_INPUTS.IOC_STS_CONFIG_OK | No configuration. | Configuration OK. |
| vPN_MGMT_INPUTS.IOC_STS_CONFIG_DOWNLOADING | | A new configuration is downloading |
| vPN_MGMT_INPUTS.IOC_STS_KEYFILE_ERROR | | Missing or wrong keyfile |
| vPN_MGMT_INPUTS.IOC_STS_STARTED | Not Started | Started |
| vPN_MGMT_INPUTS.IOC_STS_ERROR_DIAG_SET | No error | Error occured (see Diagnostic area) |
| vPN_MGMT_INPUTS.IOC_STS_PLC_WD_ERR | Watchdog ok or watchdog mechanism disabled | Watchdog mechanism detects that PLC is not |

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| | | |
|---|---|---|
| | | running. |

Possible combinations of the flags IOC_STS_CONFIG_OK, IOC_STS_CONFIG_DOWNLOADING, IOC_STS_KEYFILE_ERROR and IOC_STS_STARTED with their respective meaning are

| Flags Set | Comment |
|---|---|
| no flag set | There is no configuration inside the PROFINET Controller. To use PROFINET download a configuration |
| IOC_STS_KEYFILE_ERROR | BAD pnengine.dat. |
| IOC_STS_CONFIG_DOWNLOADING | A new configuration download is pending. |
| IOC_STS_CONFIG_OK | Configuration is valid. Waiting start from PLC |
| IOC_STS_CONFIG_OK and IOC_STS_STARTED | Configuration is valid. PROFINET is started. |

- * During a configuration download sequence .IOC_STS_CONFIG_OK is off (= "No Configuration").
- At the end of the configuration download sequence, the new configuration will be immediately started, if the IOC_START_STOP.bit0 equals 1.

If IOC_STS[1].bit2 is set, the MAC address protection mechanism detected an issue and PROFINET cannot be started.

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## IOD_CONN_STS Registers

The following 128 bits contain the connection state of each IO-device.

| PROFINET IO-Controller to CPU | | | |
|---|---|---|---|
| **Global Variable Identifier** | **IO-Device Number** | **Values** | |
| | | **0** | **1** |
| vPN_MGMT_INPUTS.IOD_CONN_STS[0]<br>…<br>vPN_MGMT_INPUTS.IOD_CONN_STS[15] | 0<br>..<br>15 | Not Connected | Connected |
| vPN_MGMT_INPUTS.IOD_CONN_STS[16]<br>…<br>vPN_MGMT_INPUTS.IOD_CONN_STS[31] | 16<br>..<br>31 | | |
| … | … | | |
| vPN_MGMT_INPUTS.IOD_CONN_STS[116]<br>…<br>vPN_MGMT_INPUTS.IOD_CONN_STS[127] | 116<br>..<br>127 | | |

## IOD_ERR_STS Registers

The following 128 bits indicate for each IO-device, whether an error has occurred.

| PROFINET IO-Controller to CPU | | | |
|---|---|---|---|
| **Global Variable Identifier** | **IO-Device number** | **Values** | |
| | | **0** | **1** |
| vPN_MGMT_INPUTS.IOD_ERR_STS[0]<br>…<br>vPN_MGMT_INPUTS.IOD_ERR_STS[15] | 0<br>..<br>15 | No Error | Error |
| vPN_MGMT_INPUTS.IOD_ERR_STS[16]<br>…<br>vPN_MGMT_INPUTS.IOD_ERR_STS[31] | 16<br>..<br>31 | | |
| … | … | | |
| vPN_MGMT_INPUTS.IOD_ERR_STS[116]<br>…<br>vPN_MGMT_INPUTS.IOD_ERR_STS[127] | 116<br>..<br>127 | | |

For each IO-device the following combinations are possible:

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| IOD_CONN_STS | IOD_ERR_STS | Meaning |
|---|---|---|
| 0 | 0 | IO-device not connected because no connection requested. |
| 1 | 0 | IO-device connected, connection without error. |
| 0 | 1 | IO-device not connected.<br>In automatic mode connection not possible.<br>In manual, last connection request failed. |
| 1 | 1 | IO-device connected but connection in error |

## Device Advanced Status (IOD_ADV_STS Registers)

For each IO-device a byte in the variable 'vPN_ACYCLIC_DIAG_INPUTS.IOD_ADV_STS' contains the detailed status error code, when the corresponding bit in IOD_ERR_STS is set. Each element in the word array 'IOD_ADV_STS' contains the status codes of two devices, the status of the device with an odd index is placed in the low byte, the status of the device with an even index is placed in the high byte.

| IOD_CONN_STS, IOD_ERR_STS | Byte Value in IOD_ADV_STS | Comment |
|---|---|---|
| N/A | 0 | IO-device Status is not set. (no error) |
| 1,1 | 1 | The IO-device produces in stop mode |
| 1,1 | 2 | One of IOPS in input frame is in bad. |
| 1,1 | 3 | One of IOCS in input frame is in bad. |
| 1,1 | 4 | IO-device Configuration does not match. |
| 1,1 | 5..99 | Reserved |
| 0,1 | 100 | No answer from the IO-device at the DCP identify request. The configured name is not present on the network. |
| 0,1 | 101 | Duplicate name for the IO-device. The DCP identify request received several answers from different IO-devices. |
| 0,1 | 102 | Duplicate IP address detected during DCP identify request. |
| 0,1 | 103 | Out of AR resource. The device is already connected and do not accept more connection. |
| 0,1 | 103-252 | Reserved, to be completed during development. |
| 0,1 | 253 | Connection failed. |
| 0,0 | 254 | Never connected. This IO-device ID is present in |

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| | | |
|---|---|---|
| | | the configuration, but the PROFINET stack never sent a connect request. |
| 0,0 | 255 | Not used. This IO-device ID is not present in the configuration. |

## Diagnostic Area (ADV_DIAG_* Registers)

In the ADV_DIAG_* registers the PROFINET stack can report some advanced information on the PROFINET Controller state (used for technical support only).

| **From IO-Controller to CPU** | | |
|---|---|---|
| **Global Variable Identifier** | **Contents** | |
| vPN_ACYCLIC_DIAG_INPUTS.ADV_DIAG_ERR_CODE | PROFINET stack error code | 0: Stack running well |
| | | 1: MAC address check fails |
| | | 2: MAC file encrypted not found |
| | | 3: Assert |
| | | 4: Error system |
| vPN_ACYCLIC_DIAG_INPUTS.ADV_DIAG_ERR_CODE2 | PROFINET stack error code (high word) | 0 (currently not used) |
| vPN_ACYCLIC_DIAG_INPUTS.ADV_DIAG_ADD_INFO | Additional information depending on the main error code. See below | |

| **Error code value** | **Additional information (word 2 to 19)** | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | All 0 | | | | | | | | | | | | | | | |
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | .. | .. | .. | .. | .. | .. | 17 | 18 |
| | MAC address PROFINET Controller | | | MAC address stack | | | | | | | | | | | | |
| 2 | All 0 | | | | | | | | | | | | | | | |
| 3 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | .. | .. | .. | .. | .. | .. | 17 | 18 |
| | Line in the file | File name where the assert appears. | | | | | | | | | | | | | | |

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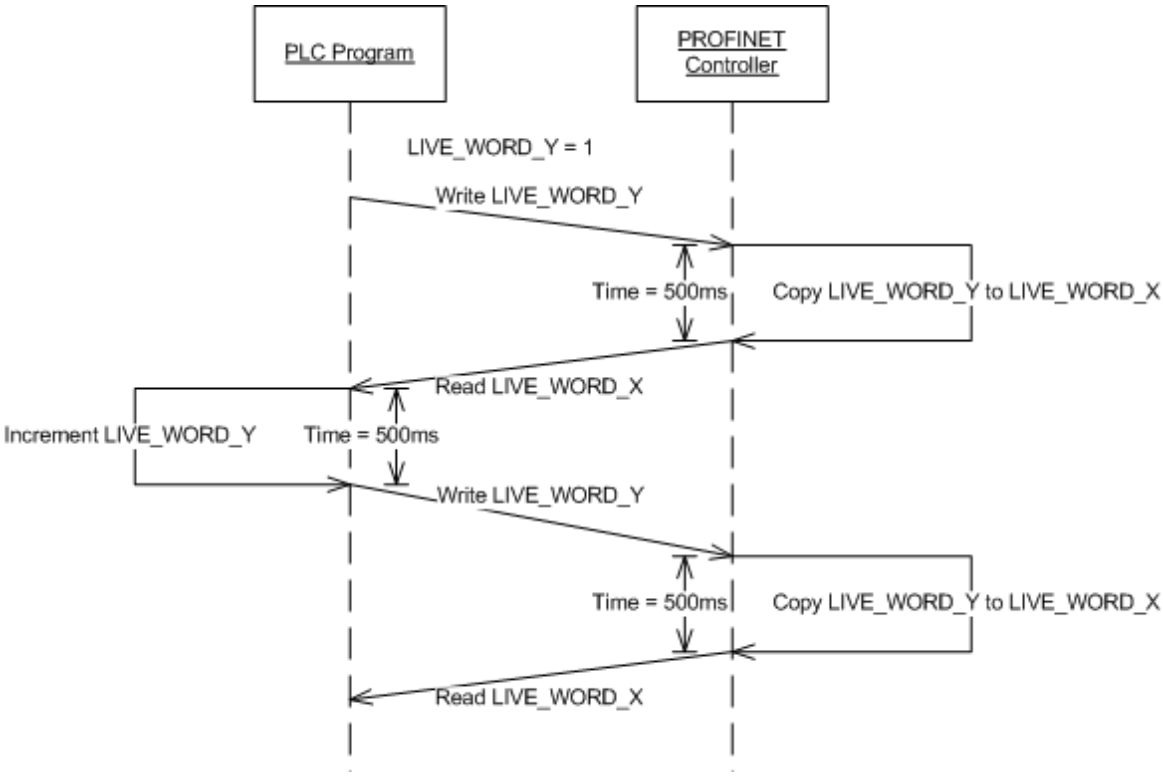
| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | 0 | 1 | 2 | 3 | … | 18 |
| | ErrCde | ErrDec | Errcod1 | Errcod2 | | |

## 2.1.5 PLC Program Watchdog

### LIVE_WORD_X and LIVE_WORD_Y Registers

The live word register variables 'vPN_CYCLIC_INPUTS.LIVE_WORD_X' and 'vPN_CYCLIC_OUTPUTS.LIVE_WORD_Y' allows the PLC to activate a watchdog mechanism between the PLC program and the PROFINET Controller. By default this mechanism is not activated (LIVE_WORD_X =0)
The following scenario applies:




By default the LIVE_WORD_Y register is set to 0, meaning that no check is activated.
To activate the mechanism, PLC sets LIVE_WORD_Y to 1 or to any value different from 0

The IO-controller reads the LIVE_WORD_Y value in an interval of 500 ms. If the value is identical three consecutive times (1.5s) and differs from 0, the IO-controller will consider the PLC as no longer running. In this case IO-controller sets the IOC_STS.bit17 for indication.
If activated this watchdog mechanism is the only way for the IO-controller to detect that a PLC program is currently running. In this case any attempt to download a new configuration will display a warning message to alert the end user.
Once the mechanism is activated the PLC has to write a new value each 500 ms. The mechanism can be stopped at any time by writing 0 again to the LIVE_WORD_Y register.
Each 500ms the IO-controller also copies the LIVE_WORD_Y read value in the LIVE_WORD_X register If the PLC does not read the same value after a maximum of 1 second, the PLC can consider that the IO-controller is no longer running and start any appropriate action.

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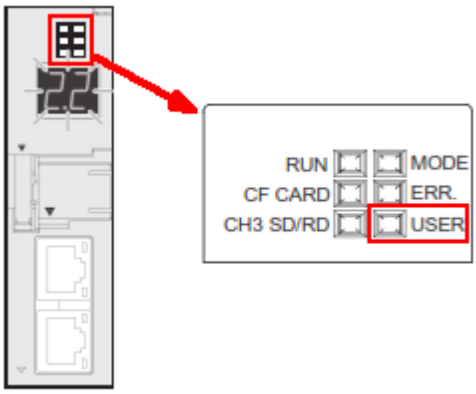
### 2.1.6 PLC and PROFINET Controller States (RUN/STOP)

| PLC STATE | PROFINET Controller STATE | Comment |
|---|---|---|
| RUN | RUN | PROFINET stack is in RUN.<br>IOPS and IOCS have status GOOD<br>Input data are updated in the High Speed Area |
| RUN | STOP | PROFINET stack is in STOP.<br>Output data = old values and IOPS and IOCS set to BAD<br>Input data are updated in the high speed area |
| STOP | RUN | PROFINET stack is in RUN.<br>Output data = old values an IOPS and IOCS set to GOOD<br>Input data are updated in the high speed area |
| STOP | STOP | PROFINET stack is in STOP.<br>Output data = old values an IOPS and IOCS set to BAD<br>Input data are updated in the high speed area |

## 2.2 LED Display

### 2.2.1 User LED

The 'USER' LED is the bottom-right one in the six LEDs group on the front of the ME1PN1FW-Q.




This LED signals PROFINET Controller specific states in combination with the 7-segment LED display. For the meaning of the other LEDs please consult the user manual of the Q12DCCPU-V.

| State | Meaning |
|---|---|
| RED | Error, see 7 segments LED |
| RED slow blink | Some IO-devices are not connected. |
| RED rapid Blink | Network storm |

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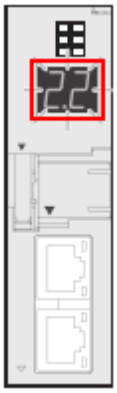
| | |
|---|---|
| Green | All OK. All IO-devices connected whatever their mode (manual or automatic) |
| Green slow blink | All OK. All IO-devices in automatic mode are connected. All IO devices in manual mode are not connected. |
| Green rapid Blink | All OK. All IO-devices in automatic mode are connected. Some IO devices in manual mode are connected, some are not connected |
| Orange | All IO-devices connected whatever their mode (manual or automatic). However, some configuration mismatches exist. |
| Orange slow blink | All IO-devices in automatic mode are connected. All IO devices in manual mode are not connected. However, some configuration mismatches exist. |
| Orange rapid Blink | All IO-devices in automatic mode are connected. Some IO devices in manual mode are connected, some are not connected. However, some configuration mismatches exist. |

### 2.2.2 7-Segment LED Display

The 7-segment display is located on the front of the ME1PN1FW-Q.



It indicates PROFINET Controller specific states in combination with the status of the User LED.

| User LED | 7 segment value | Meaning |
|---|---|---|
| Red fix | 1 | No Ethernet link |
| | 2 | No configuration |
| | 3 | No IO-device connected |
| | 4 | The engine.dat file is corrupted. |
| | 5 | Stack failed to start |
| | 6 | Declare Device failed (config corrupt) |
| | 7 | Error system see 3.1.7.4. |

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| | | |
|---|---|---|
| Green fix | Off | All IO-devices connected |
| N/A | BL | A DCP blink command is receiving. |
| OFF | 8 | Wait Start from register. |
| Red fix | 9 | The stack can't start. The initialization sequence failed |
| | 10 | Memory allocation error during initialization sequence |
| | 11 | CNFMAST.001 is missing in folder \RAM\Profinet\Default |
| | 12 | CNFDEVIC.001 is missing in folder \RAM\Profinet\Default |
| | 13 | CNFNAME.001 is missing in folder \RAM\Profinet\Default |
| | 14 | copycross10.bin is missing in folder \RAM\Profinet\Default |
| | 15 | CNFMAST.001 is missing in folder \RAM\Profinet |
| | 16 | CNFDEVIC.001 is missing in folder \RAM\Profinet |
| | 17 | CNFNAME.001 is missing in folder \RAM\Profinet |
| | 18 | copycross10.bin is missing in folder \RAM\Profinet |
| | 19 | Configuration files Access error. File is open but not readable |
| | 20 | Configuration files check error. Values read in the file are not acceptable. Configuration of high speed area is wrong |
| | 21 | Init controller failed. Cannot start the PROFINET firmware |
| | 22 | GX Configurator Remote access initialization failed |

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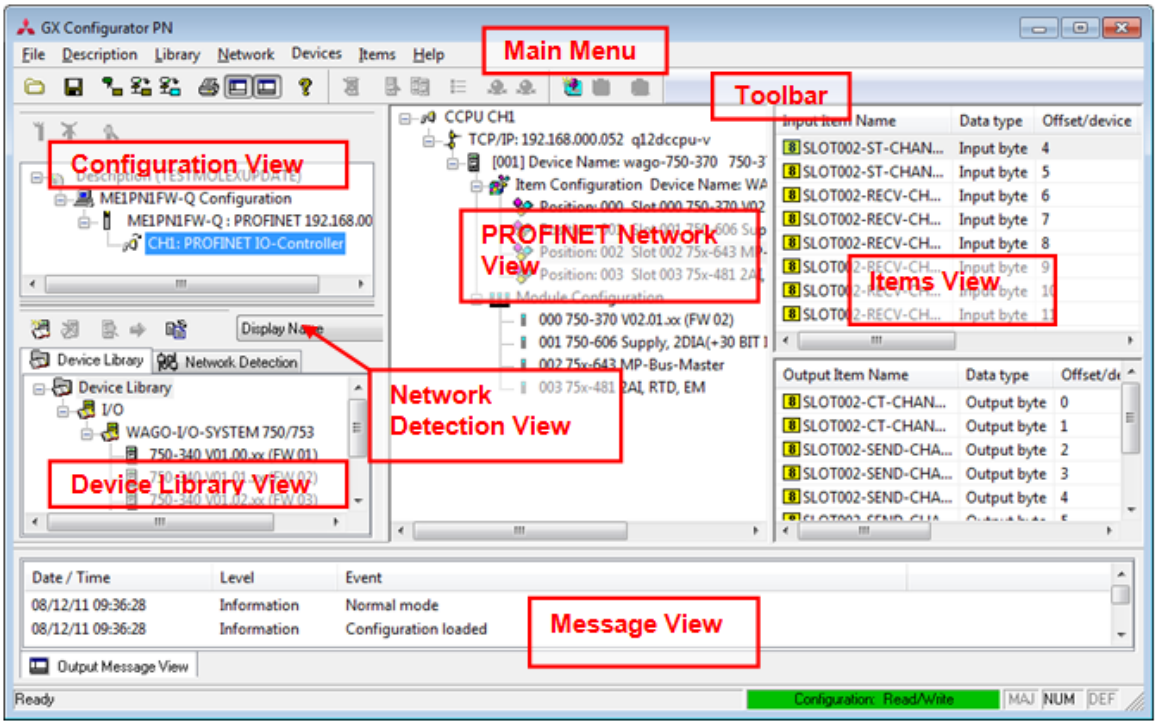
# 3 Getting to know GX Configurator-PN

## GX Configurator-PN Concept

GX Configurator-PN (GXPN) is the configuration tool for PROFINET I/O interfaces in MITSUBISHI PLCs. It provides functions for defining a PROFINET I/O network, validating the configuration and downloading it to the respective PLC module via a MITSUBISHI automation network.
GX Configurator-PN is capable of downloading configuration data to the PROFINET I/O module via a variety of different communication types. The module can be located in a PLC rack directly connected to the PC or in a PLC rack, which is connected to other PLCs in a separate network.
GX Configurator-PN takes information on PROFINET I/O slaves from GSD files, which are specific to the respective slave and usually provided by the slave hardware vendor. It generates multi-CPU parameters for use in GX Developer (GD) and GX IEC Developer (GID).

## User Interface

The graphical user interface of GX Configurator-PN assists the user by making the most important functions easily accessible.




The main items of the user interface are

- Main Menu
- Toolbar
- Configuration View
- PROFINET Network View
- Device Library View
- Network Detection View
- Items View
- Message View

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# 4 Installation

## Before You Begin

### Copyright

**Important Notice:**

This software is protected by copyright. By opening the distribution disks package you automatically accept terms and conditions of the license agreement.
You are only permitted to make one single copy of the original distribution disks for your own backup and archiving purposes.

### Software Purpose

This software is a configuration utility software package which will be used to configure the following PROFINET I/O network interface modules of MELSEC System Qn series PLCs:

- PROFINET I/O master module ME1PN1FW-Q

## 4.1 System Requirements

To install the GX Configurator-PN software package your computer has to meet the following requirements

### Minimum Hardware Requirements

- Pentium II 350 Mhz processor (for Vista: 1 GHz processor)
- 256 MB RAM for Microsoft ® Windows XP
- 1 GB RAM for Microsoft ® Windows Vista
- VGA compatible graphics adapter
- 17"/43 cm diag. VGA monitor
- At least 200 MB free hard disk space
- CD-ROM drive
- interface for communication with the PLC system

### Software Requirements

GX Configurator-PN is a 32-bit software that runs on the following operating systems

- Microsoft ® Windows XP Home or Professional Edition
- Microsoft ® Windows Vista Home (or higher)
- Microsoft ® Windows 7 Home (or higher), both 32- and 64-bit versions

### Related MELSOFT Software

GX Configurator-PN is typically used together with one of the PLC programming packages for MITSUBISHI PLCs

- 'GX Developer' (GD)
- 'GX IEC Developer' (GID)
- 'GX Works 2' (GXW2)

Certain functions of GX Configurator-PN are restricted or not available for specific PLC programming packages.

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# 4.2 Software Installation

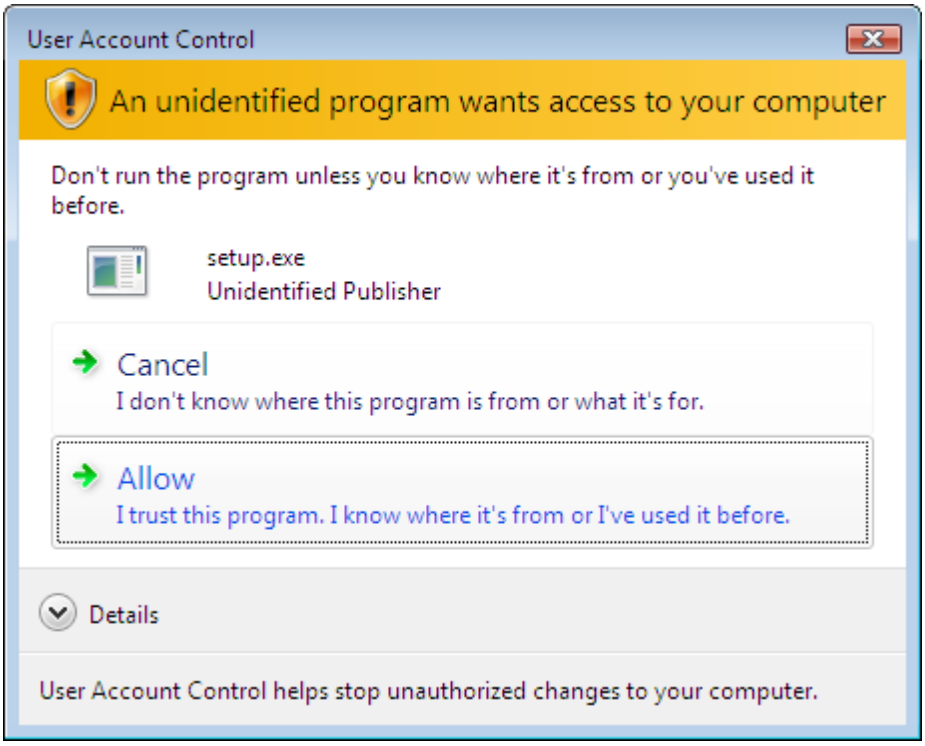
## GX Configurator-PN Setup

To install the GX Configurator-PN software you need to have Microsoft ® Windows properly installed. You may require administrator privileges when installing the software.
If an older version of GX Configurator-PN is already installed, uninstall it first. After the de-installation please start the installation of the new version. If you want to keep the older version of GX Configurator-PN, please select a different directory for the new version. A de-installation of the older version, after the newer version has been installed, will also damage the newer version. Therefore please reinstall the new version after uninstalling both the older and the newer GX Configurator-PN versions, if you encounter problems. Please stop all other running software before the installation and do not run other installation programs during the installation of GX Configurator-PN.

## Installing GX Configurator-PN

To start the installation, proceed as follows:

1. Insert the installation CD-ROM into your CD-ROM drive.
2. If you have 'Autorun' enabled for the drive, the setup should start automatically.
3. If the setup is not started automatically, please locate the 'setup.exe' file and execute it.
4. If you see the following message on a Windows ® Vista operating system, please select 'Allow'


User Account Control
An unidentified program wants access to your computer
Don't run the program unless you know where it's from or you've used it before.
setup.exe
Unidentified Publisher
Cancel
I don't know where this program is from or what it's for.
Allow
I trust this program. I know where it's from or I've used it before.
Details
User Account Control helps stop unauthorized changes to your computer.

5. Follow the given instructions that guide you through the installation procedure. Continue with **Next**.

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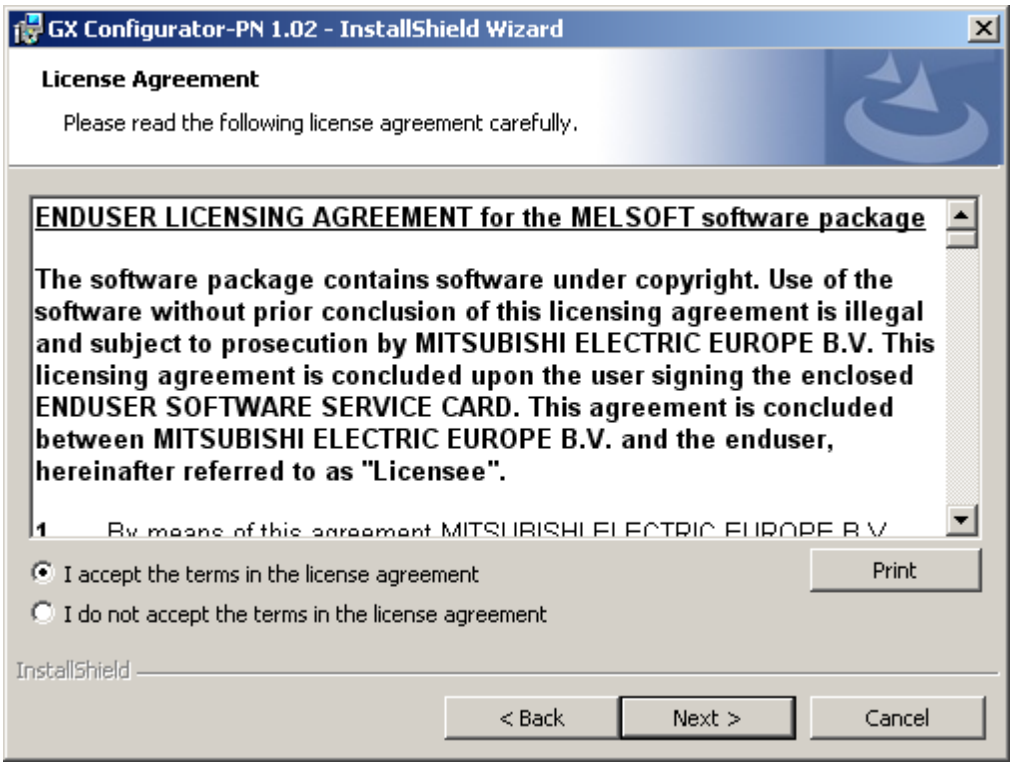
GX Configurator-PN 1.02 - InstallShield Wizard
Welcome to the InstallShield Wizard for GX Configurator-PN 1.02
The InstallShield(R) Wizard will install GX Configurator-PN 1.02 on your computer. To continue, click Next.
WARNING: This program is protected by copyright law and international treaties.
< Back
Next >
Cancel

6. The licensing agreement is displayed. Please read these terms carefully. If you accept the license agreement, you can proceed with the installation by clicking **Next**. Otherwise the installation is aborted.


GX Configurator-PN 1.02 - InstallShield Wizard
License Agreement
Please read the following license agreement carefully.
ENDUSER LICENSING AGREEMENT for the MELSOFT software package
The software package contains software under copyright. Use of the software without prior conclusion of this licensing agreement is illegal and subject to prosecution by MITSUBISHI ELECTRIC EUROPE B.V. This licensing agreement is concluded upon the user signing the enclosed ENDUSER SOFTWARE SERVICE CARD. This agreement is concluded between MITSUBISHI ELECTRIC EUROPE B.V. and the enduser, hereinafter referred to as "Licensee".
I accept the terms in the license agreement
I do not accept the terms in the license agreement
Print
InstallShield
< Back
Next >
Cancel

7. Enter your name, organization and the product serial number. Click on **Next** to proceed.

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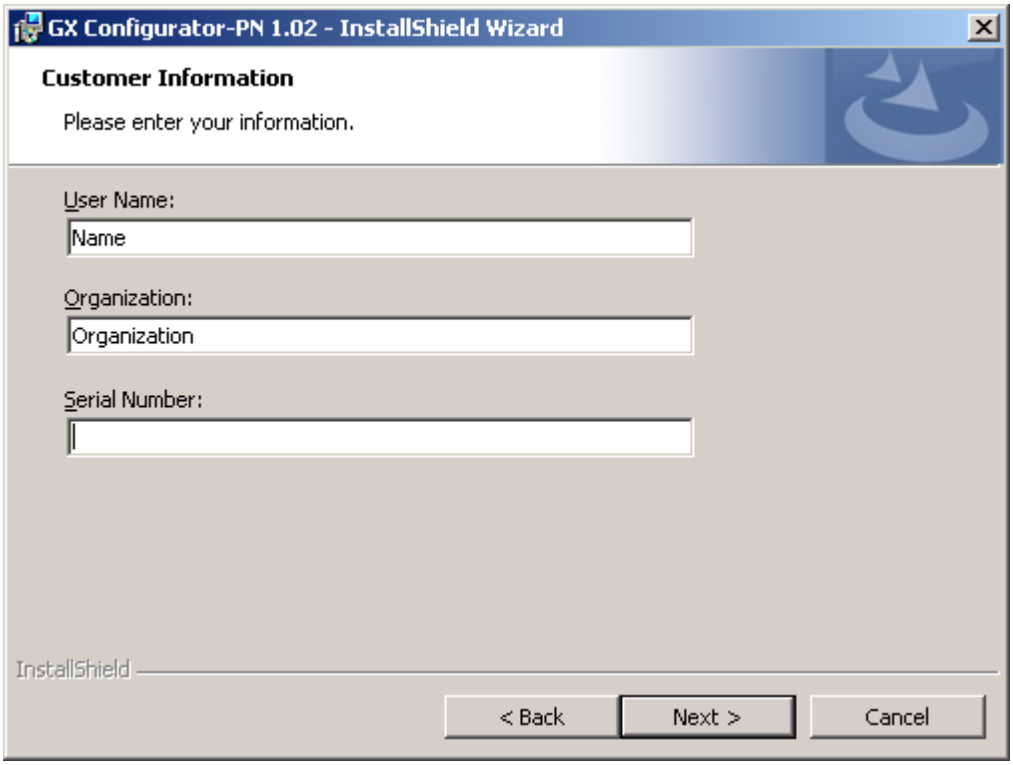
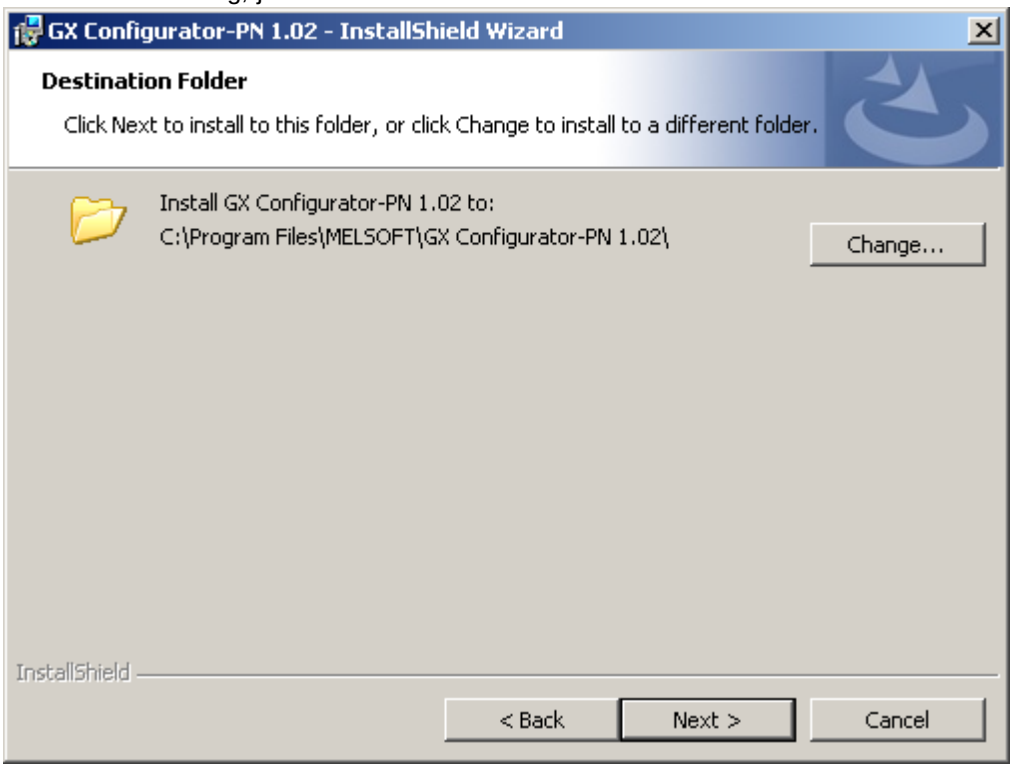



8. Enter the destination folder where you want the GX Configurator-DP software to be installed (default **C:\Program Files\MELSOFT\GX Configurator-PN 1.02**). If you want to install to a different directory, click on **Change** and select the installation directory. If you agree with the default setting, just click on **Next**.


GX Configurator-PN 1.02 - InstallShield Wizard
Destination Folder
Click Next to install to this folder, or click Change to install to a different folder.
Install GX Configurator-PN 1.02 to:
C:\Program Files\MELSOFT\GX Configurator-PN 1.02\
Change...
InstallShield
< Back
Next >
Cancel

9. The installation is started by pressing the **Install** button.

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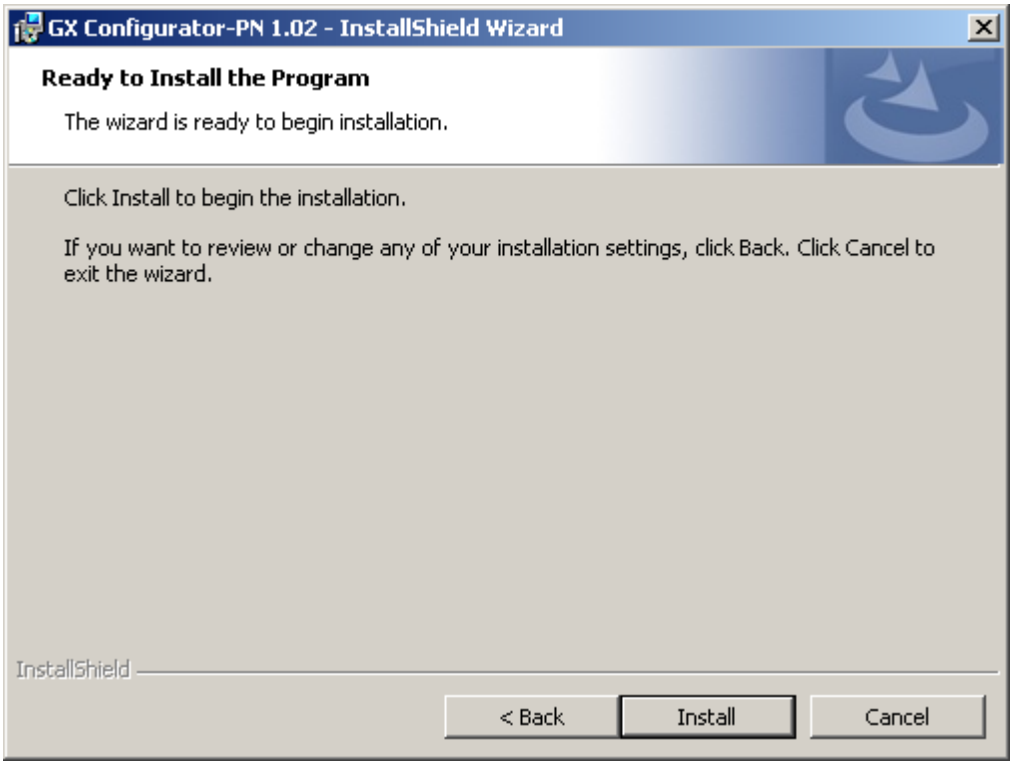
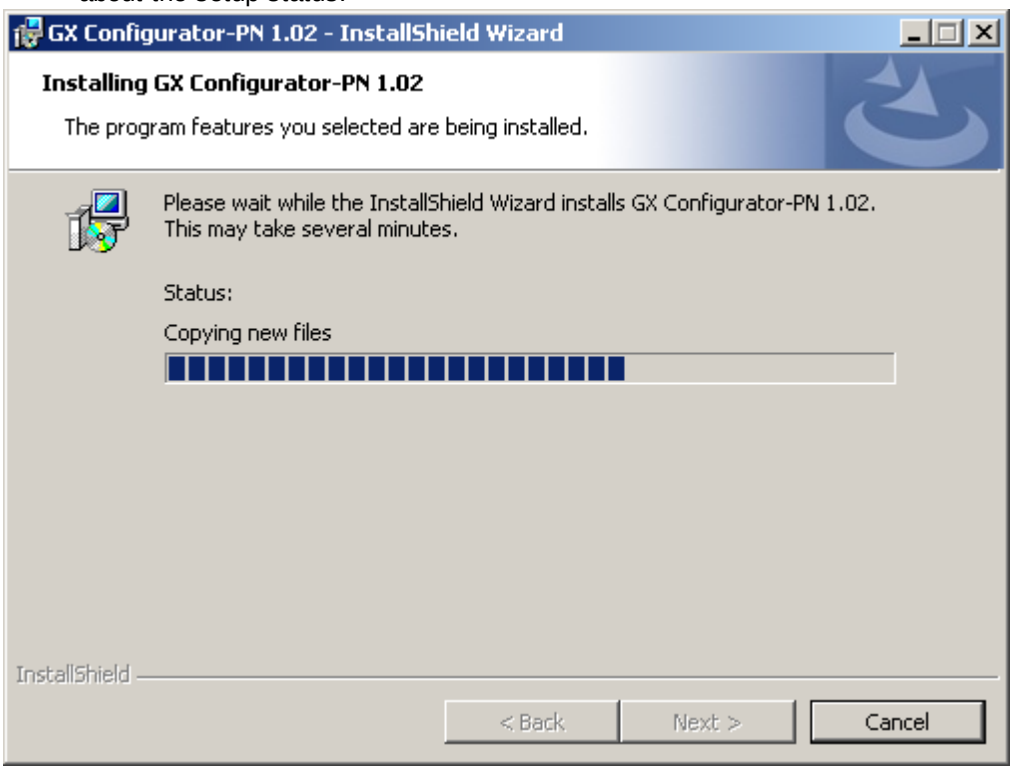

GX Configurator-PN 1.02 - InstallShield Wizard
Ready to Install the Program
The wizard is ready to begin installation.
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back
Install
Cancel

10. After pressing the 'Install' button the installation is started. Progress bars will inform you about the setup status.


GX Configurator-PN 1.02 - InstallShield Wizard
Installing GX Configurator-PN 1.02
The program features you selected are being installed.
Please wait while the InstallShield Wizard installs GX Configurator-PN 1.02. This may take several minutes.
Status:
Copying new files
InstallShield
< Back
Next >
Cancel

11. After the installation has been successfully completed, you see the following message

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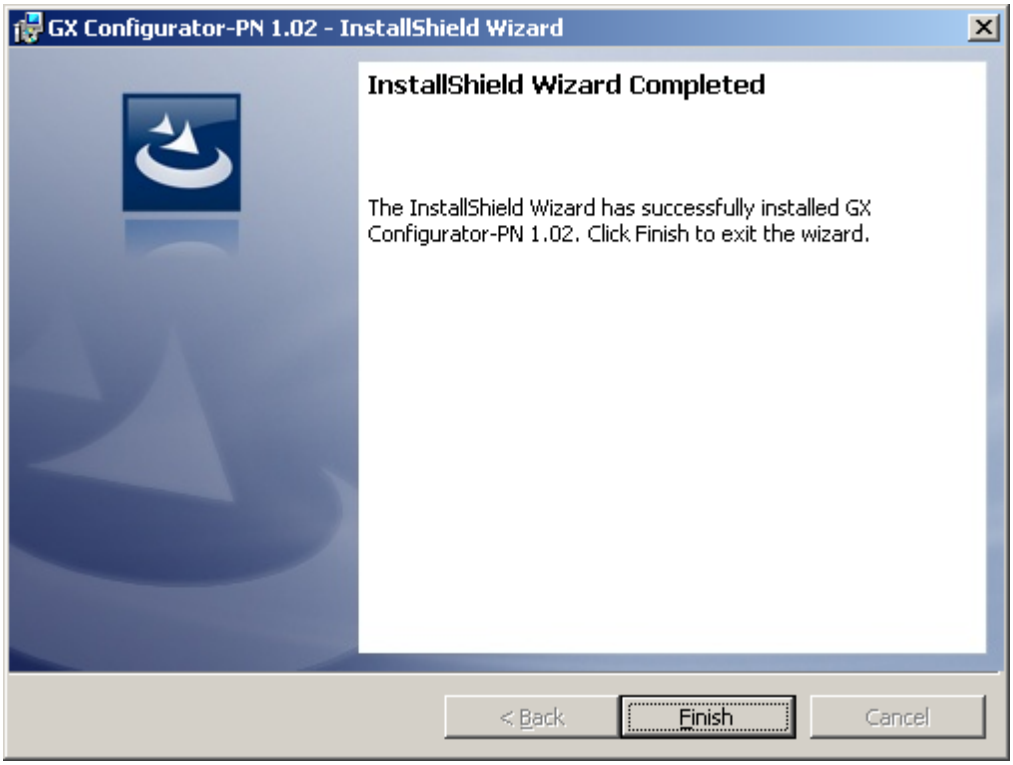
GX Configurator-PN 1.02 - InstallShield Wizard
InstallShield Wizard Completed
The InstallShield Wizard has successfully installed GX Configurator-PN 1.02. Click Finish to exit the wizard.
< Back
Finish
Cancel

### Button Functions

With the **Next** button you will leave the current menu and enter the next menu.
With the **Back** button you go to the previous window.
**Cancel** button ends the installation procedure.

## 4.3 Installing the DCP Protocol Driver

The DCP protocol must be manually added to the Ethernet interface, which is used for communication with the PROFINET Controller. The procedure is specific for each of the following supported operating systems

- Windows XP
- Windows Vista
- Windows 7

**Note**: you may need administrator rights for the following steps!

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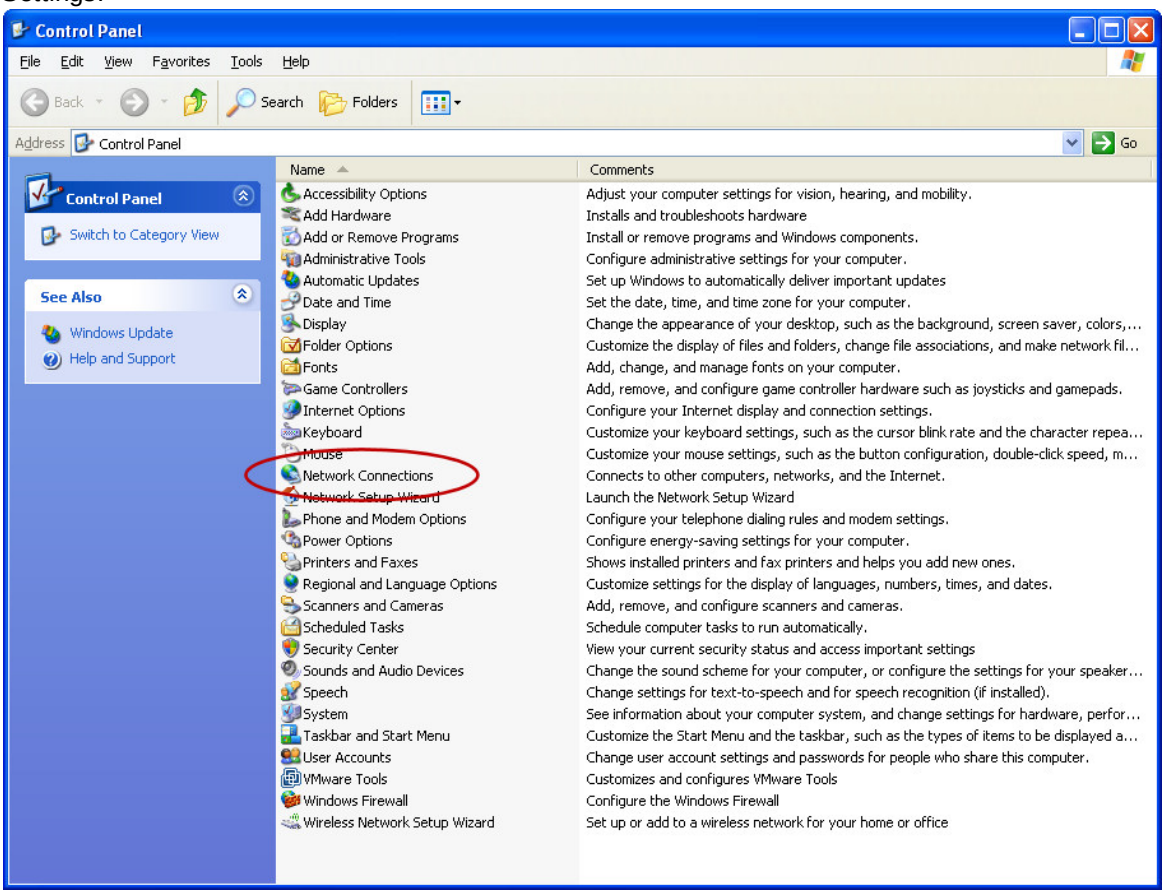
### 4.3.1 Windows XP

1.) Open the Control Panel and double click "Network Connections" to open the Network Connection Settings.


Control Panel
File Edit View Favorites Tools Help
Back Search Folders
Address Control Panel
Go
Control Panel
Switch to Category View
See Also
Windows Update
Help and Support
Name
Comments
Accessibility Options
Adjust your computer settings for vision, hearing, and mobility.
Add Hardware
Installs and troubleshoots hardware
Add or Remove Programs
Install or remove programs and Windows components.
Administrative Tools
Configure administrative settings for your computer.
Automatic Updates
Set up Windows to automatically deliver important updates
Date and Time
Set the date, time, and time zone for your computer.
Display
Change the appearance of your desktop, such as the background, screen saver, colors,...
Folder Options
Customize the display of files and folders, change file associations, and make network fil...
Fonts
Add, change, and manage fonts on your computer.
Game Controllers
Add, remove, and configure game controller hardware such as joysticks and gamepads.
Internet Options
Configure your Internet display and connection settings.
Keyboard
Customize your keyboard settings, such as the cursor blink rate and the character repea...
Mouse
Customize your mouse settings, such as the button configuration, double-click speed, m...
Network Connections
Connects to other computers, networks, and the Internet.
Network Setup Wizard
Launch the Network Setup Wizard
Phone and Modem Options
Configure your telephone dialing rules and modem settings.
Power Options
Configure energy-saving settings for your computer.
Printers and Faxes
Shows installed printers and fax printers and helps you add new ones.
Regional and Language Options
Customize settings for the display of languages, numbers, times, and dates.
Scanners and Cameras
Add, remove, and configure scanners and cameras.
Scheduled Tasks
Schedule computer tasks to run automatically.
Security Center
View your current security status and access important settings
Sounds and Audio Devices
Change the sound scheme for your computer, or configure the settings for your speaker...
Speech
Change settings for text-to-speech and for speech recognition (if installed).
System
See information about your computer system, and change settings for hardware, perfor...
Taskbar and Start Menu
Customize the Start Menu and the taskbar, such as the types of items to be displayed a...
User Accounts
Change user account settings and passwords for people who share this computer.
VMware Tools
Customizes and configures VMware Tools
Windows Firewall
Configure the Windows Firewall
Wireless Network Setup Wizard
Set up or add to a wireless network for your home or office

2.) Right click "Local Area Connection" and select "Properties" to open the "Local Area Connection Properties".

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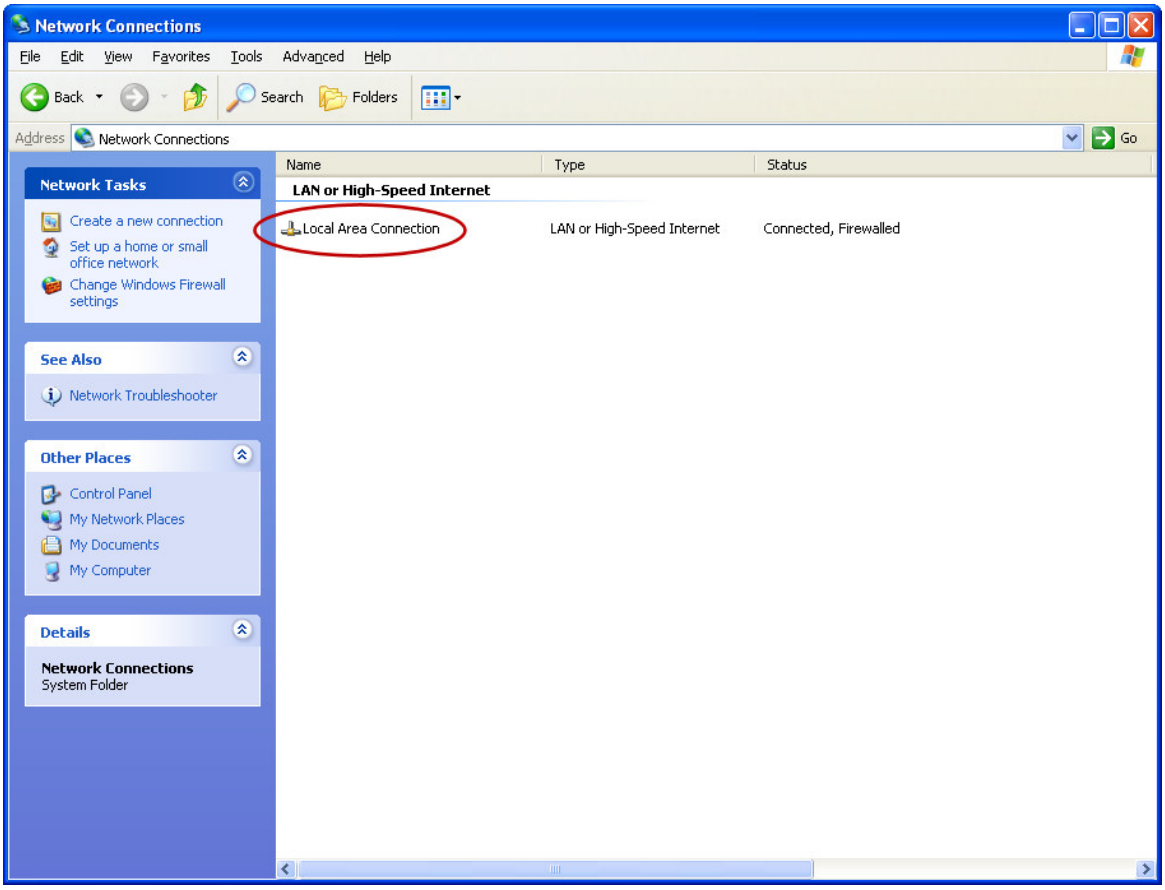


3.) Click "Install" to open the "Select Network Component Type" dialog.

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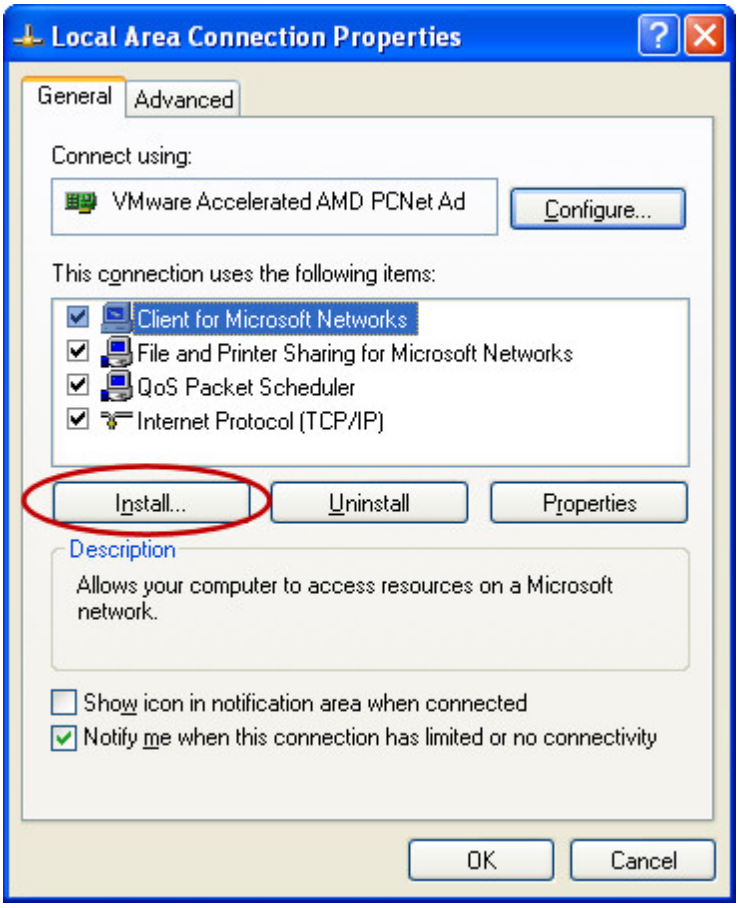
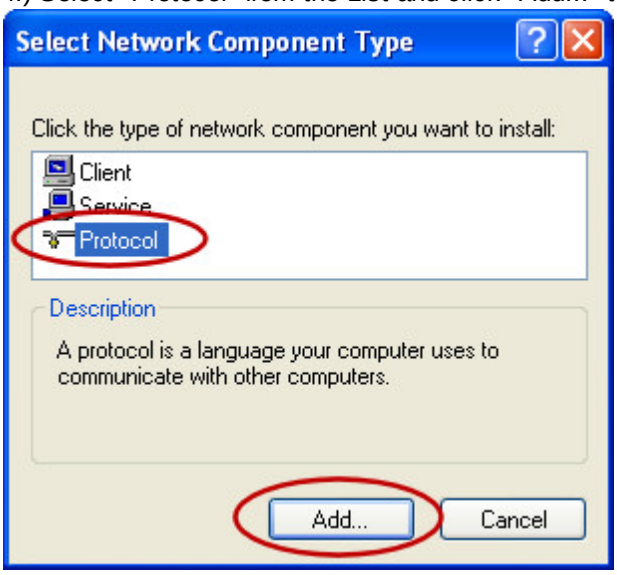



4.) Select "Protocol" from the List and click "Add..." to open the "Select Network Protocol" dialog.




5.) Select "MITSUBISHI ELECTRIC" from the "Manufacturer" List and after that "MITSUBISHI DCP driver" from the "Network Protocol" List. Then click "OK" to confirm the selection.

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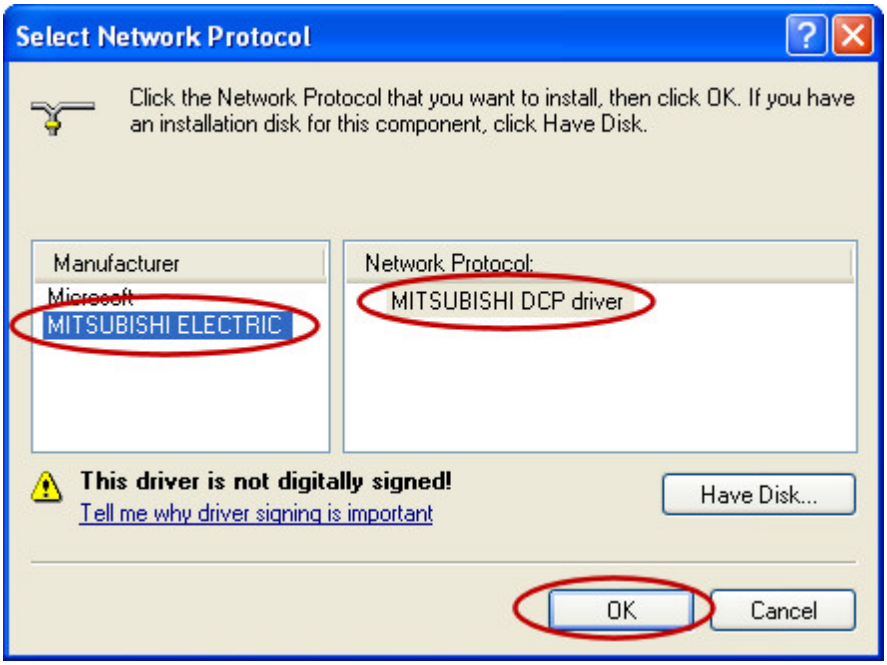
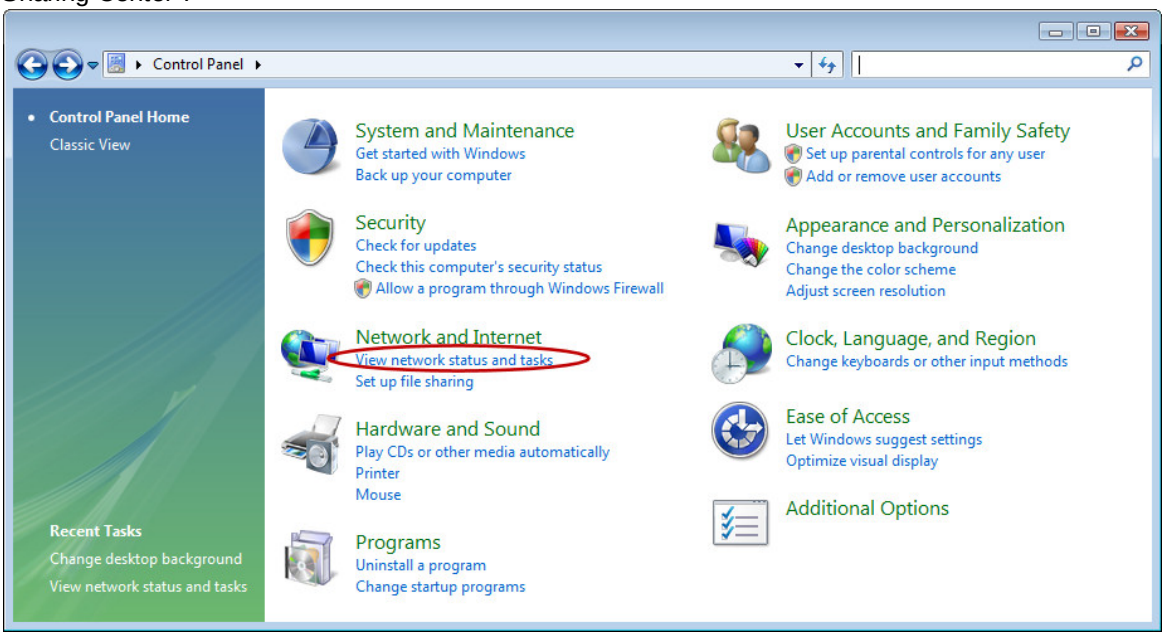

Select Network Protocol
Click the Network Protocol that you want to install, then click OK. If you have an installation disk for this component, click Have Disk.
Manufacturer
Microsoft
MITSUBISHI ELECTRIC
Network Protocol:
MITSUBISHI DCP driver
This driver is not digitally signed!
Tell me why driver signing is important
Have Disk...
OK
Cancel

The "MITSUBISHI DCP driver" is now added to the Protocol List in the dialog "Local Area Connection Properties".

### 4.3.2 Windows Vista

1.) Open the Control Panel and click "View network status and tasks" to open the "Network and Sharing Center".




2.) Click "View Status" of the "Local Area Connection" to open the "Local Area Connection Status".

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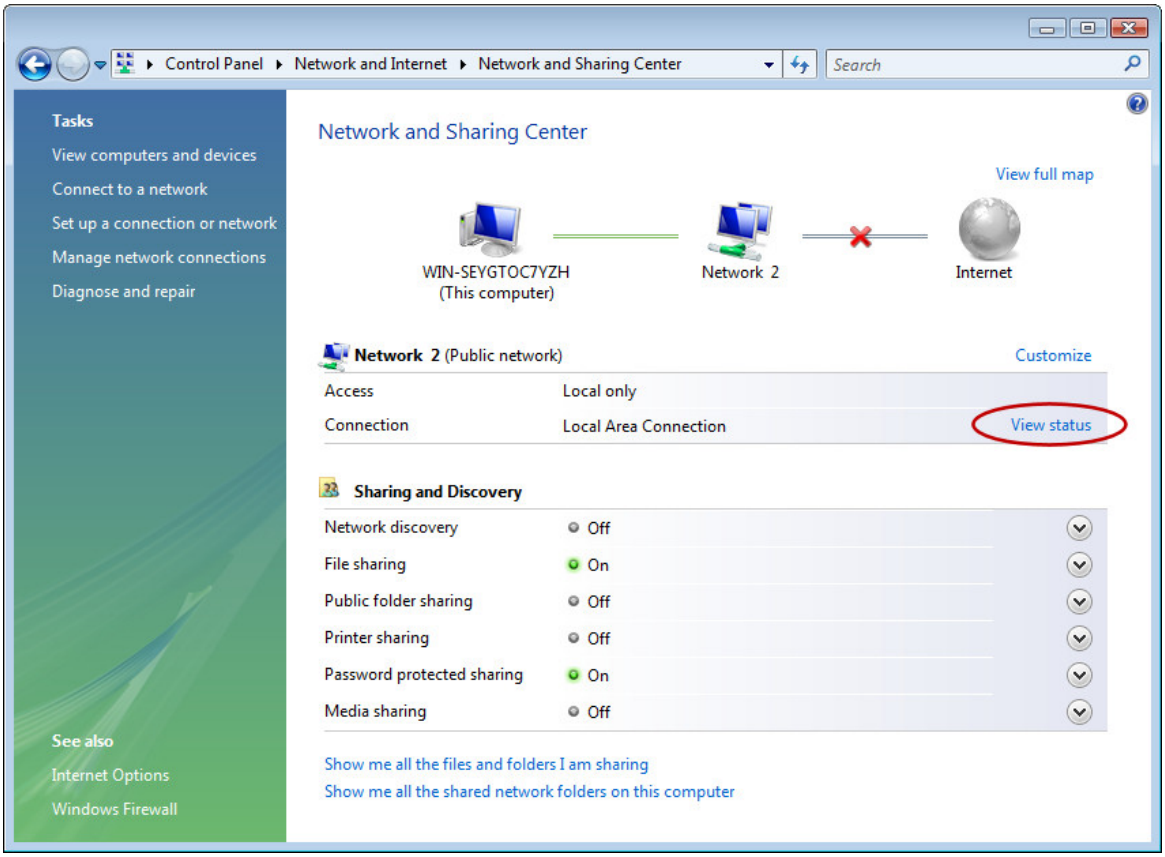


3.) Click "Properties" to open the "Local Area Connection Properties".

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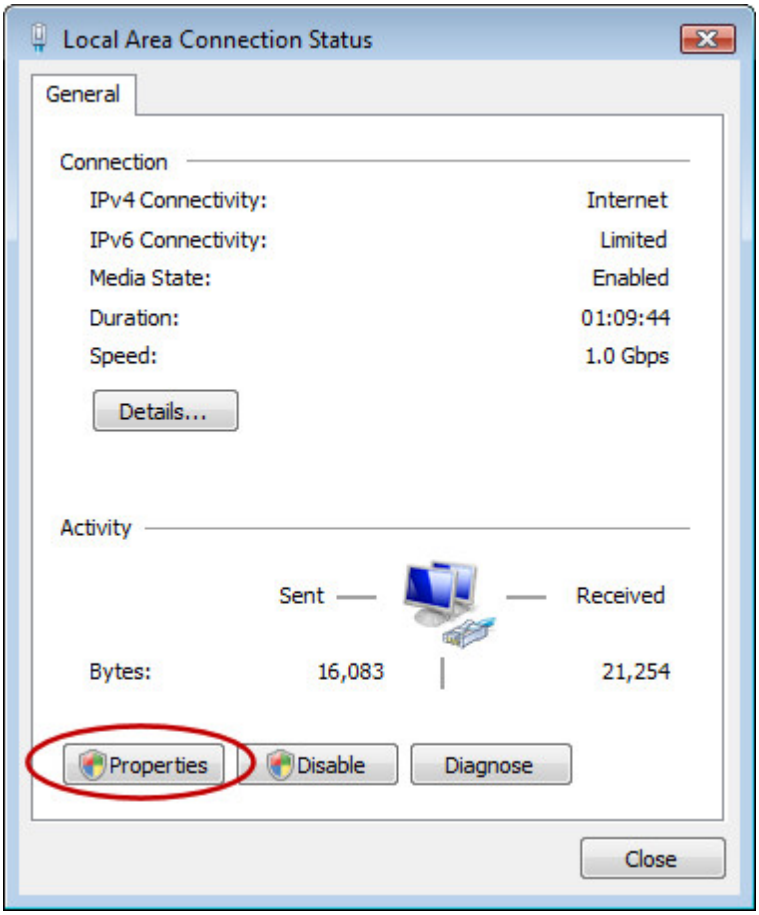
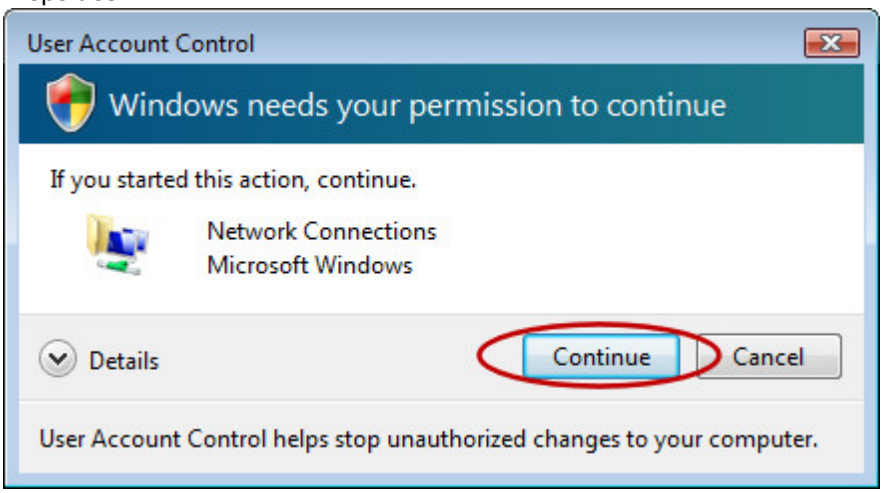



4.) Answer the "User Account Control" with "Continue" to step further to the "Local Area Connection Properties".




5.) Click "Install..." to open the "Select Network Feature Type" dialog.

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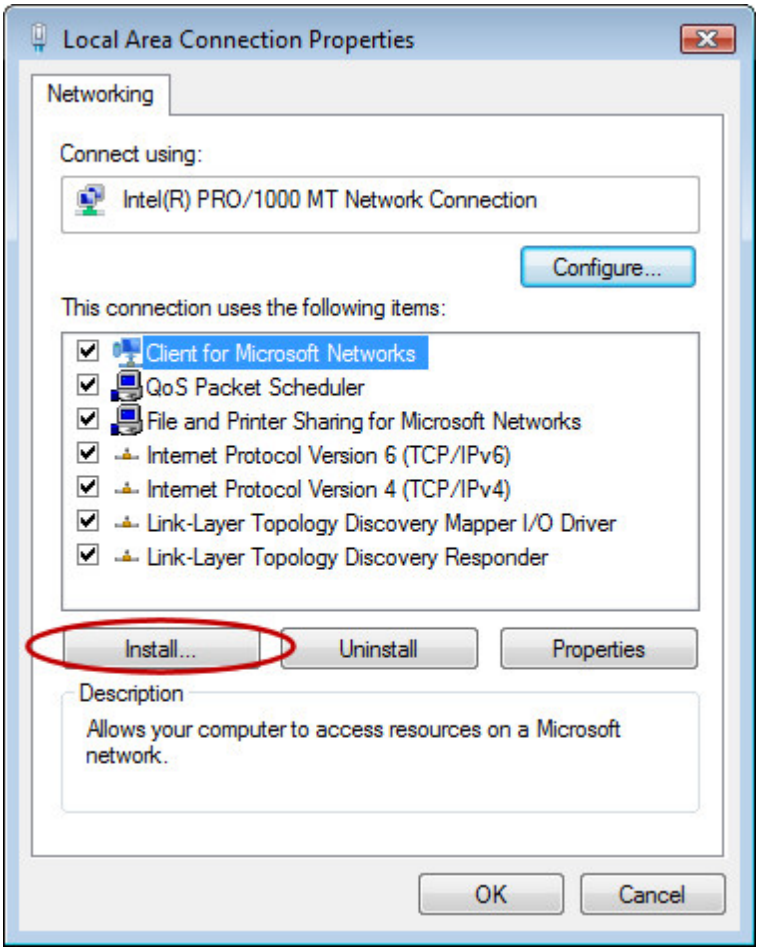
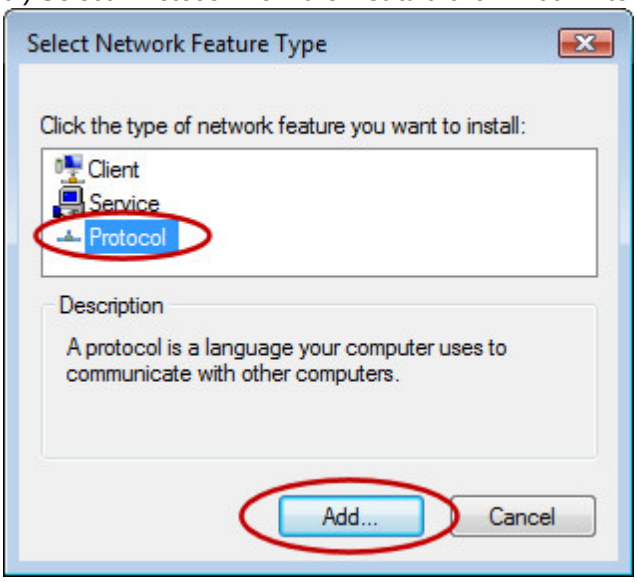



6.) Select "Protocol" from the List and click "Add..." to open the "Select Network Protocol" dialog.




7.) Select "MITSUBISHI ELECTRIC" from the "Manufacturer" List and after that "MITSUBISHI DCP driver" from the "Network Protocol" List. Then click "OK" to confirm the selection.

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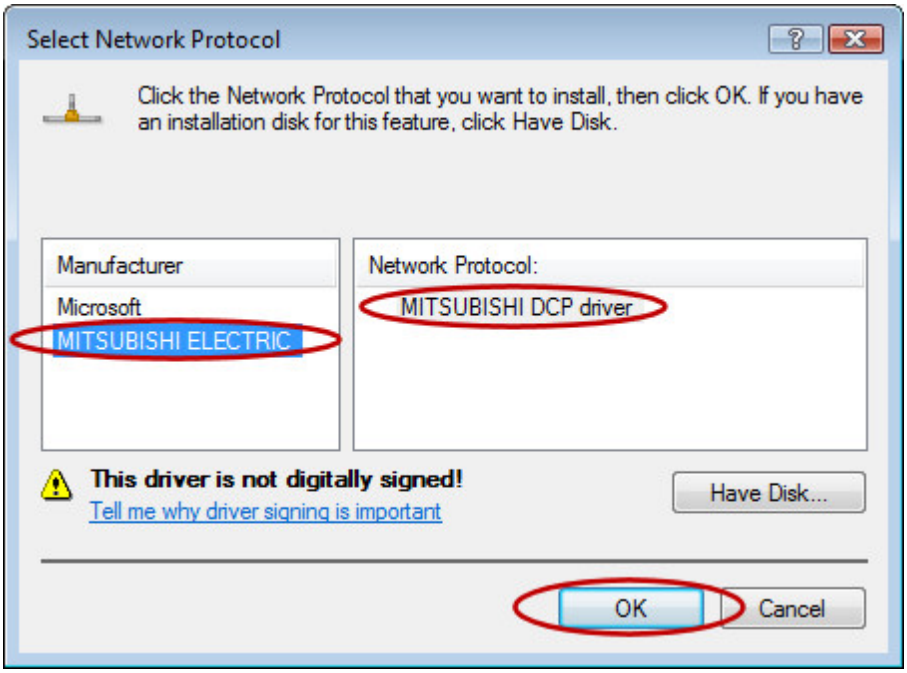
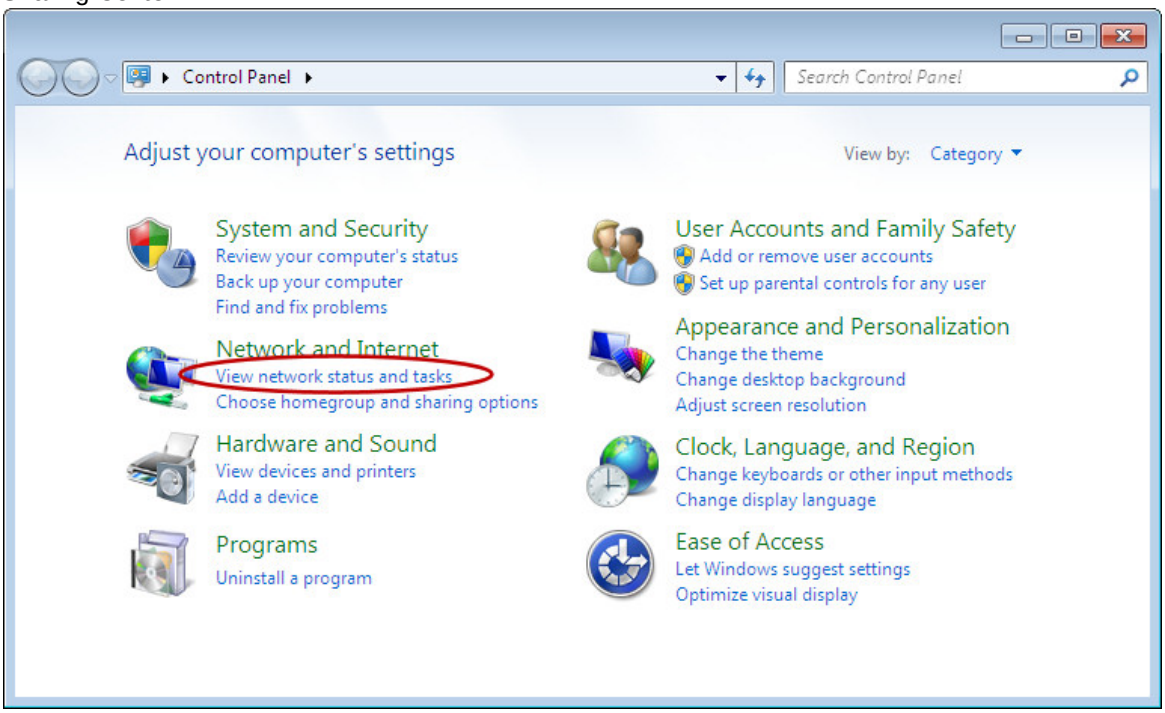

Select Network Protocol
Click the Network Protocol that you want to install, then click OK. If you have an installation disk for this feature, click Have Disk.
Manufacturer
Microsoft
MITSUBISHI ELECTRIC
Network Protocol:
MITSUBISHI DCP driver
This driver is not digitally signed!
Tell me why driver signing is important
Have Disk...
OK
Cancel

The "MITSUBISHI DCP driver" is now added to the Protocol List in the dialog "Local Area Connection Properties".

### 4.3.3 Windows 7

1.) Open the Control Panel and click "View network status and tasks" to open the "Network and Sharing Center".




2.) Click "Local Area Connection" to open the "Local Area Connection Status".

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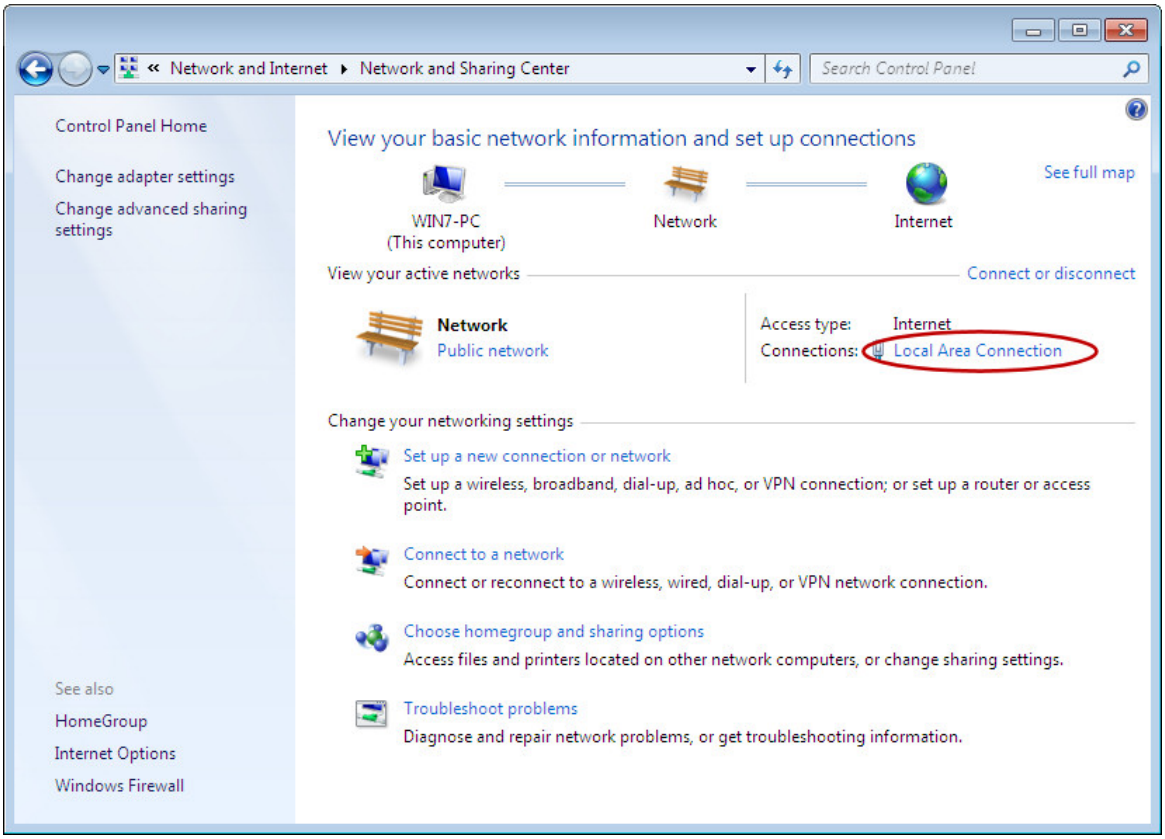
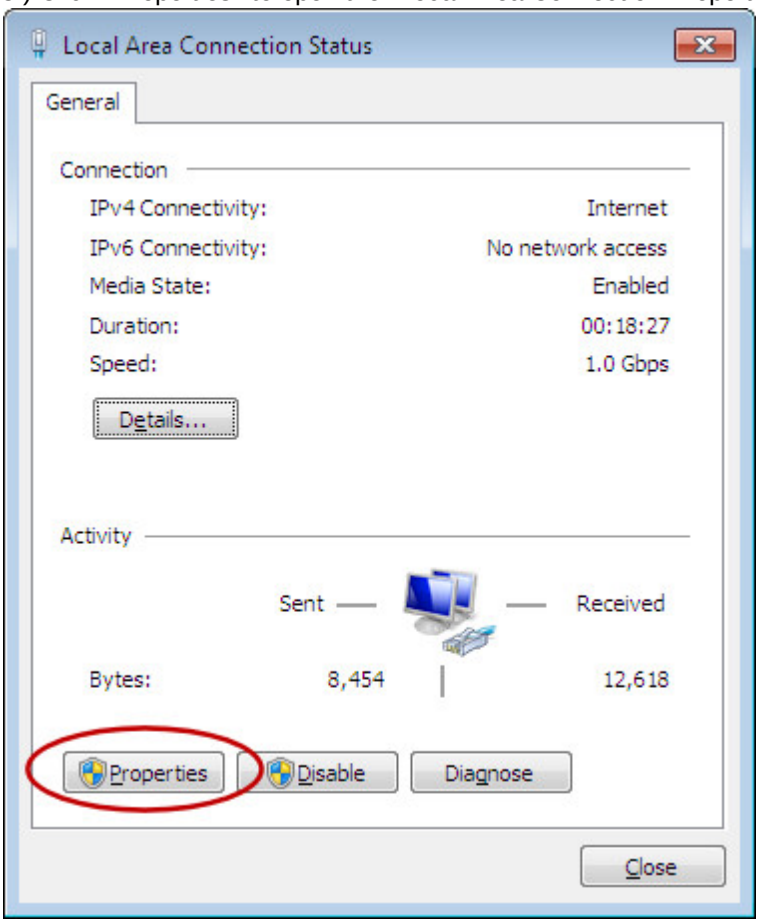

« Network and Internet ▸ Network and Sharing Center
Search Control Panel
Control Panel Home
Change adapter settings
Change advanced sharing settings
View your basic network information and set up connections
See full map
WIN7-PC
(This computer)
Network
Internet
View your active networks
Connect or disconnect
Network
Public network
Access type: Internet
Connections: Local Area Connection
Change your networking settings
Set up a new connection or network
Set up a wireless, broadband, dial-up, ad hoc, or VPN connection; or set up a router or access point.
Connect to a network
Connect or reconnect to a wireless, wired, dial-up, or VPN network connection.
Choose homegroup and sharing options
Access files and printers located on other network computers, or change sharing settings.
Troubleshoot problems
Diagnose and repair network problems, or get troubleshooting information.
See also
HomeGroup
Internet Options
Windows Firewall

3.) Click "Properties" to open the "Local Area Connection Properties".

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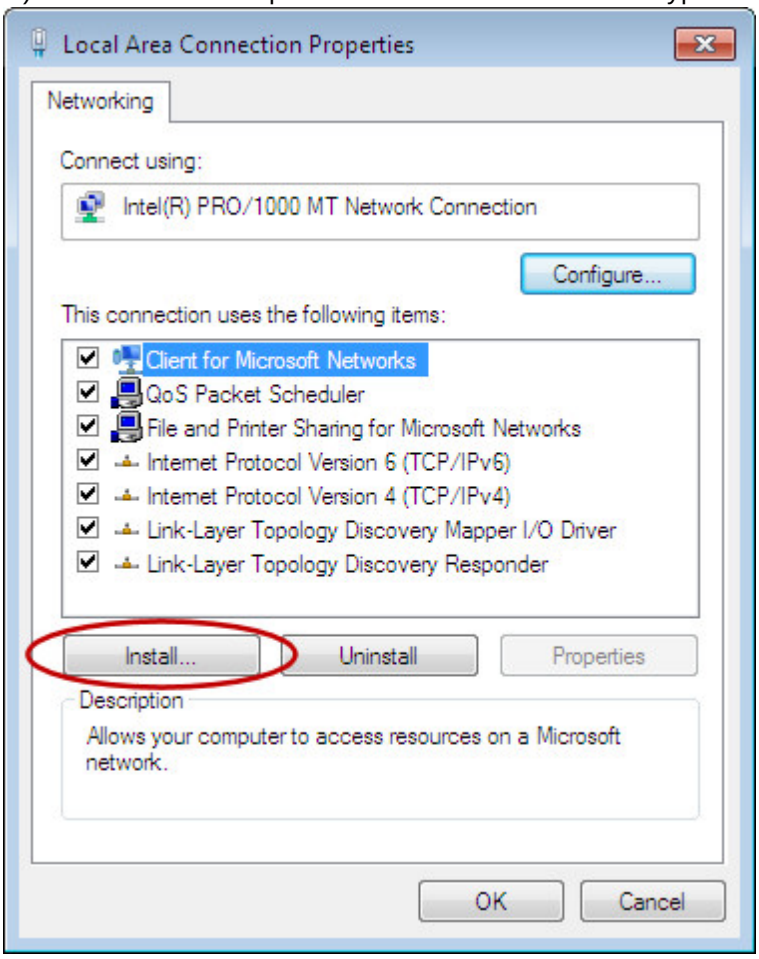
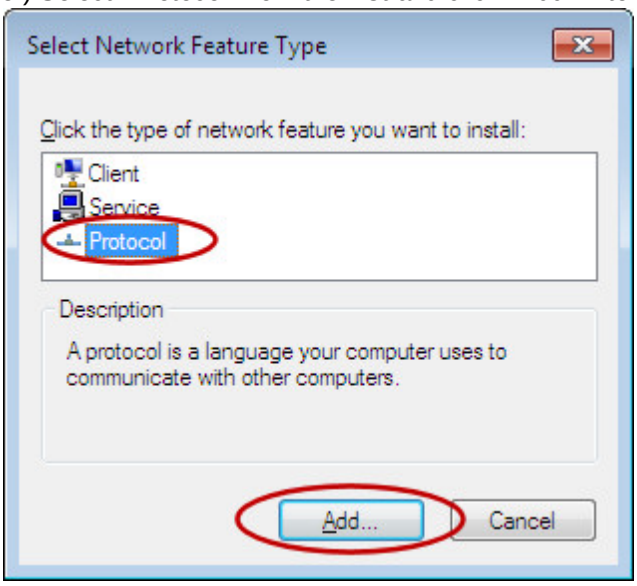
4.) Click "Install..." to open the "Select Network Feature Type" dialog.




5.) Select "Protocol" from the List and click "Add..." to open the "Select Network Protocol" dialog.




6.) Select "MITSUBISHI ELECTRIC" from the "Manufacturer" List and after that "MITSUBISHI DCP driver" from the "Network Protocol" List. Then click "OK" to confirm the selection.

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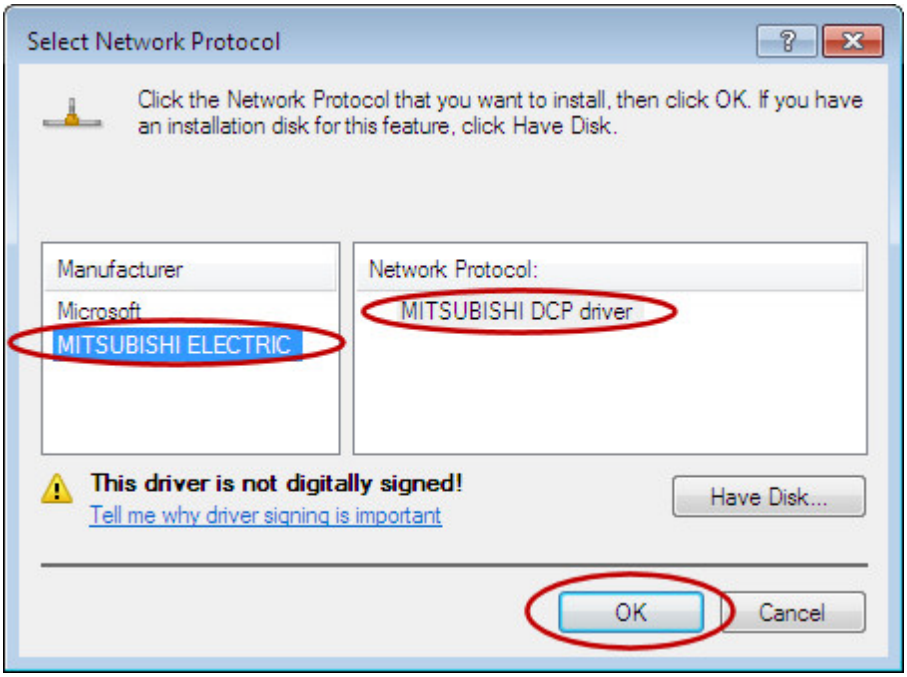
Select Network Protocol
Click the Network Protocol that you want to install, then click OK. If you have an installation disk for this feature, click Have Disk.
Manufacturer
Microsoft
MITSUBISHI ELECTRIC
Network Protocol:
MITSUBISHI DCP driver
This driver is not digitally signed!
Tell me why driver signing is important
Have Disk...
OK
Cancel

The "MITSUBISHI DCP driver" is now added to the protocol list in the dialog "Local Area Connection Properties".

## 4.4 PROFINET Controller Installation

The PROFINET Controller must be in its factory default settings, before the PROFINET I/O firmware can be installed and started. If the module has been used before or any problems are encountered during the PROFINET I/O firmware installation, the module must first be set to its factory defaults. For the detailed procedure see the section 'Troubleshooting - Factory Default Settings'.

To install the PROFINET I/O firmware the CF card received from MITSUBISHI must be inserted in the CF card slot on the module.

1. reset the module to initiate copying the contents of the CF card to the ME1PN1FW-Q memory

2. wait, until the 7-segment LED shows '**AA**', indicating that the script on the CF card has been completed without an error

3. now remove the CF card and reset the controller

4. start GX Configurator-PN, create a configuration with the correct MAC address of the PROFINET Controller and enter the IP address you want for the PROFINET Controller.

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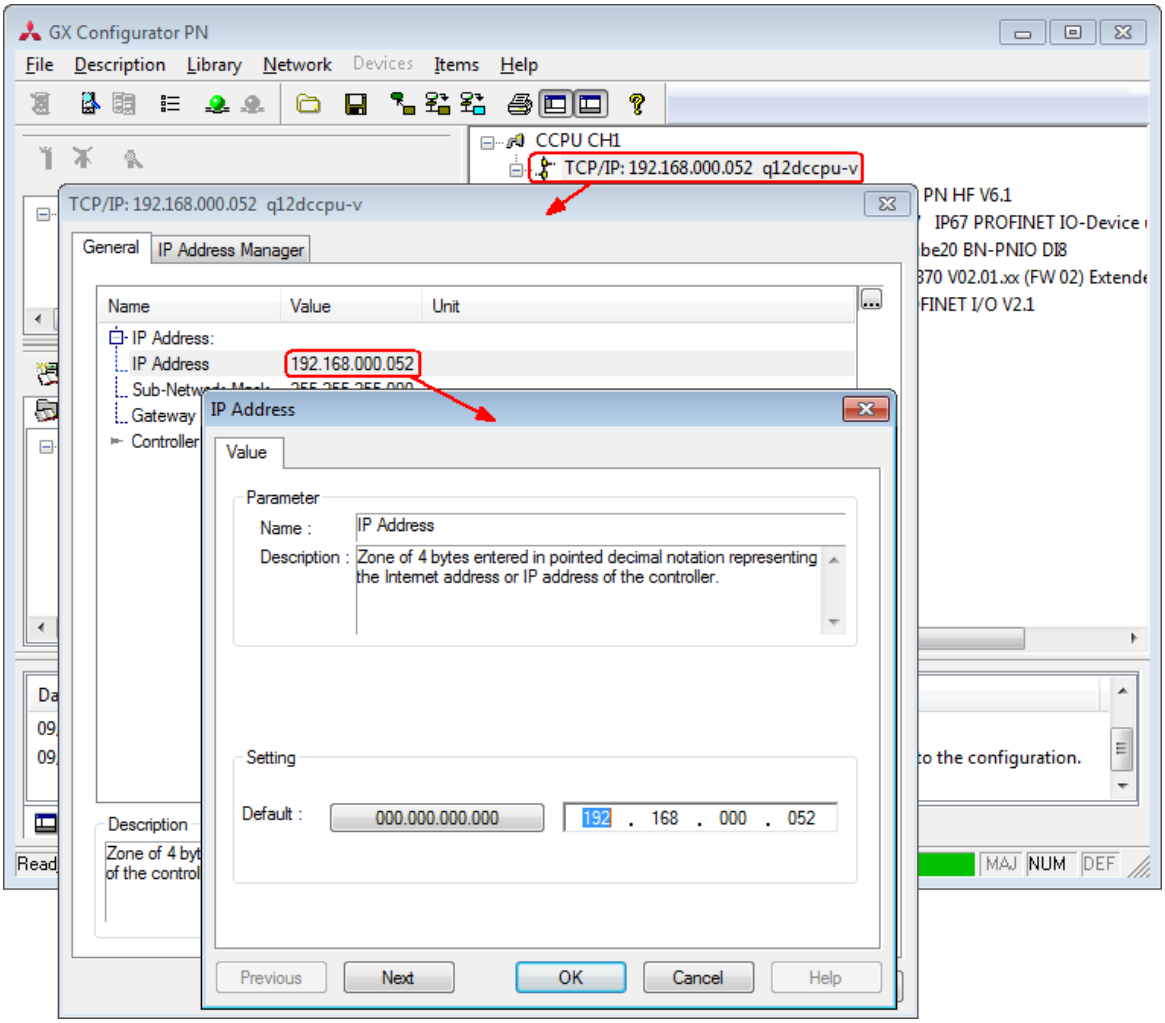
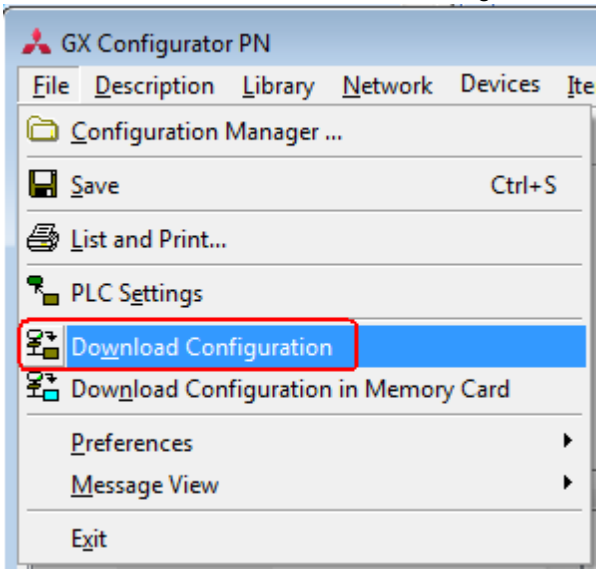



5. download the configuration (this includes setting the IP address from the default setting of the PROFINET Controller to the address assigned in the GX Configurator-PN project)




6. update the refresh settings on both the controlling Qn-CPU and the PROFINET Controller in the "PLC Settings' dialog'.

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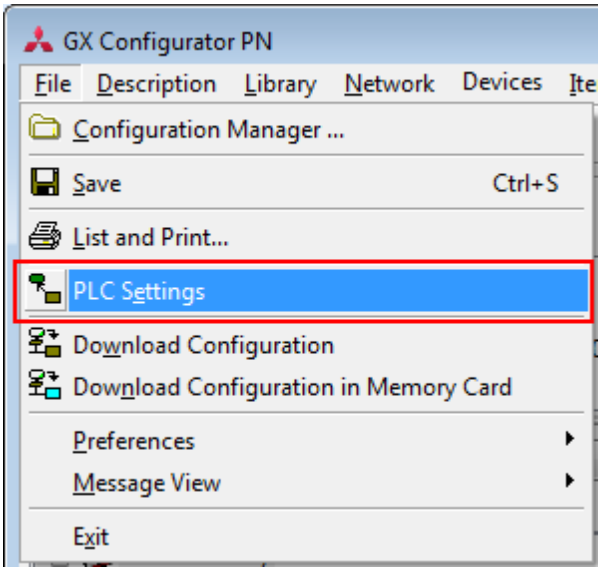
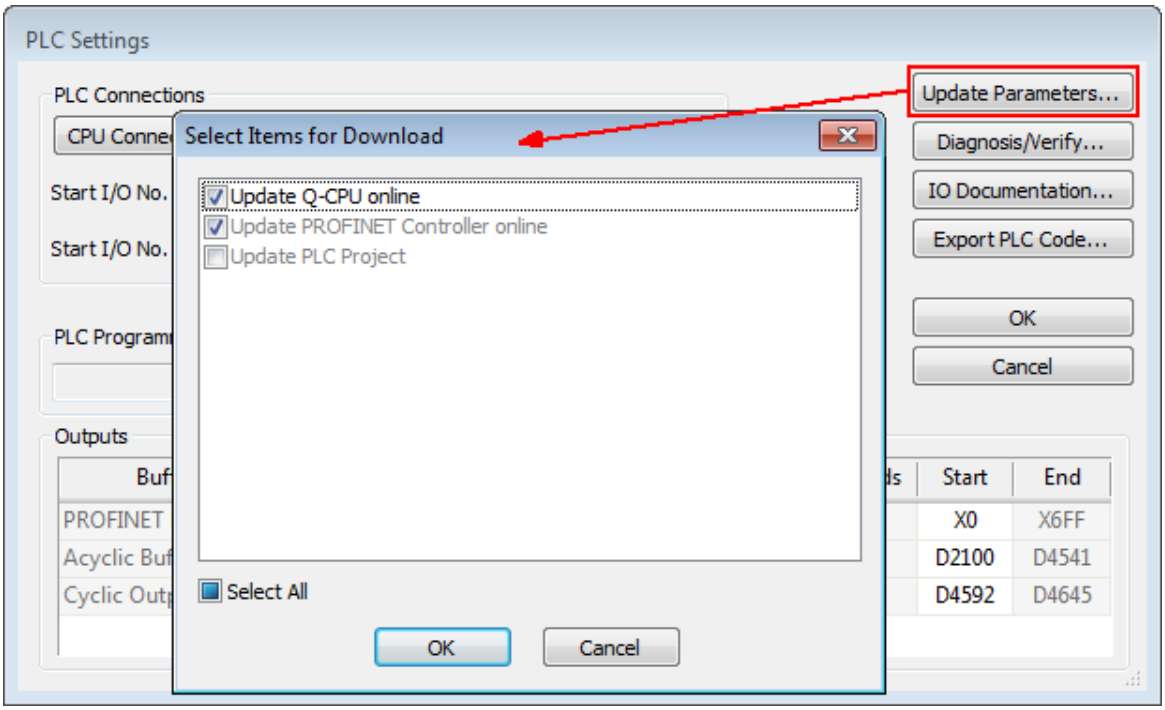

GX Configurator PN
File
Description
Library
Network
Devices
Ite
Configuration Manager ...
Save
Ctrl+S
List and Print...
PLC Settings
Download Configuration
Download Configuration in Memory Card
Preferences
Message View
Exit

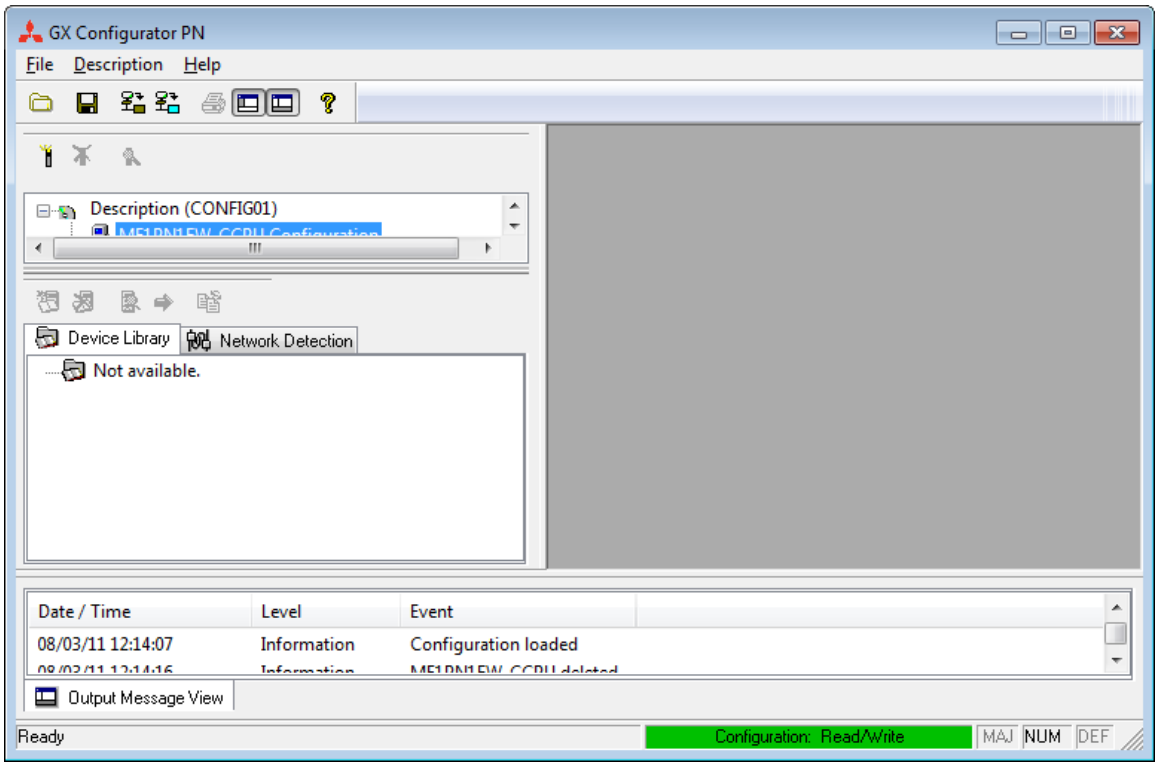

PLC Settings
PLC Connections
CPU Conne
Start I/O No.
Start I/O No.
PLC Programı
Outputs
Buf
PROFINET
Acyclic Buf
Cyclic Outp
Start
End
X0
X6FF
D2100
D4541
D4592
D4645
Update Parameters...
Diagnosis/Verify...
IO Documentation...
Export PLC Code...
OK
Cancel
Select Items for Download
Update Q-CPU online
Update PROFINET Controller online
Update PLC Project
Select All
OK
Cancel

# 5 Getting Started

Below are the main steps, which are required to configure a PROFINET I/O master module.

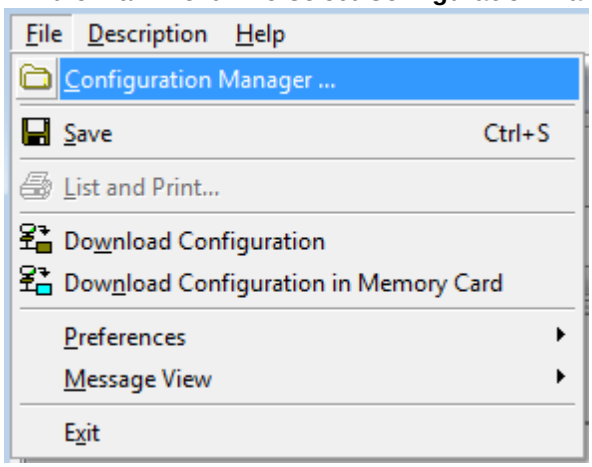
## Start GX Configurator-PN

1. Start GX Configurator-PN via the shortcut in the Programs menu. The default location of the shortcut is **Programs \ MELSOFT Application \ GX Configurator-PN 1.02 \ GX Configurator-PN 1.02**.




## Start a New Project

1. In the main menu **File** select **Configuration Manager**.




2. in the **Configuration Manager** press **New** to create a new configuration project

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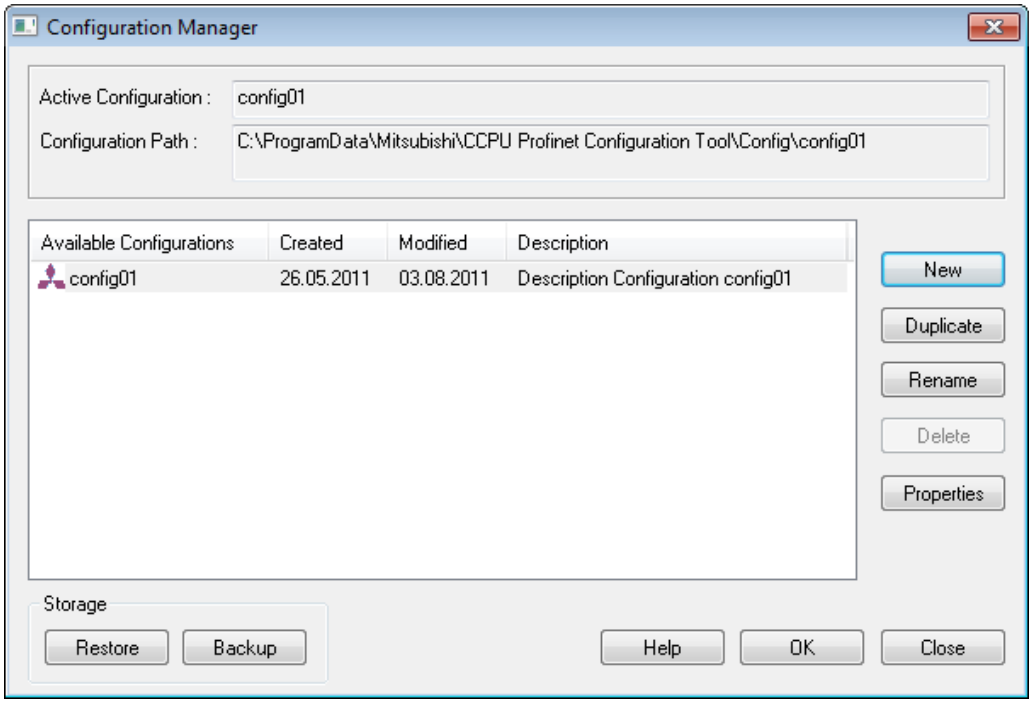
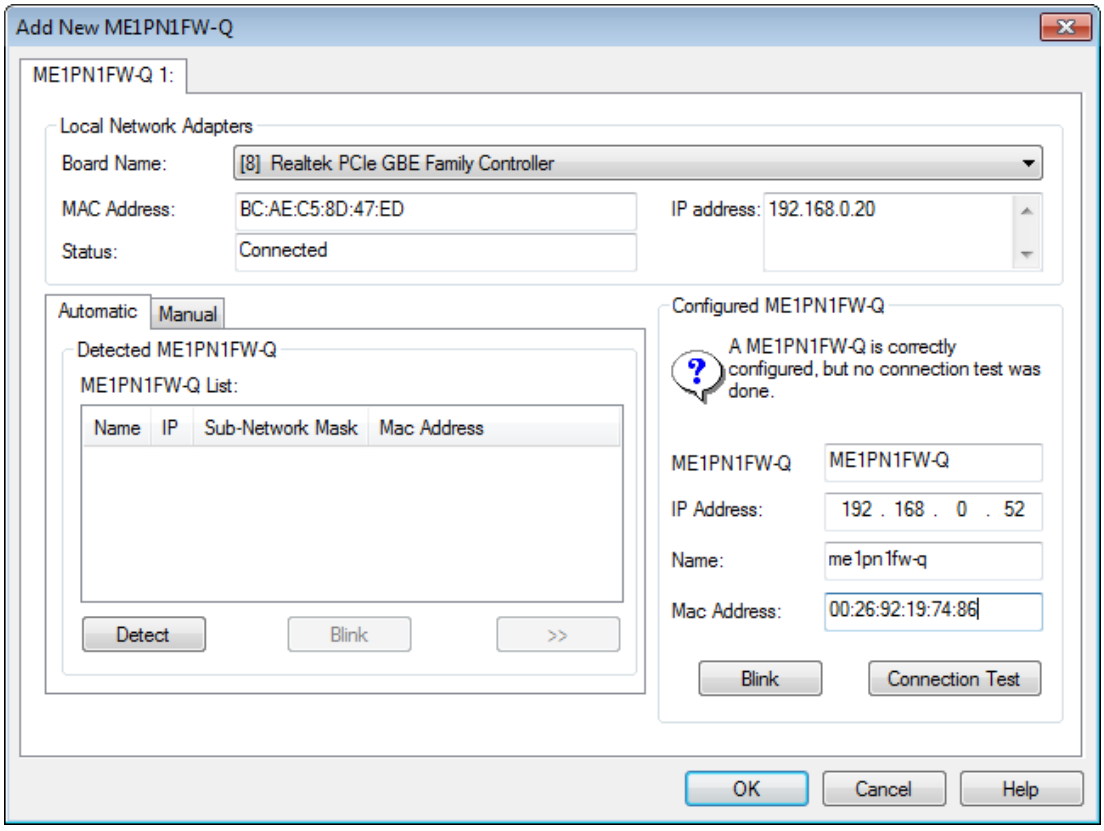



After closing the 'Configuration Manager' dialog the 'Add New ME1PN1FW-Q' dialog is displayed. The user must select the local network interface, the ME1PN1FW-Q is connected to. The user can then choose to obtain the network address of the module either automatically or manually. For details see the description of the 'Add New ME1PN1FW-Q' dialog.




3. the inserted module is now displayed in the network view and slaves can be added by drag&drop from the 'Device Library'.

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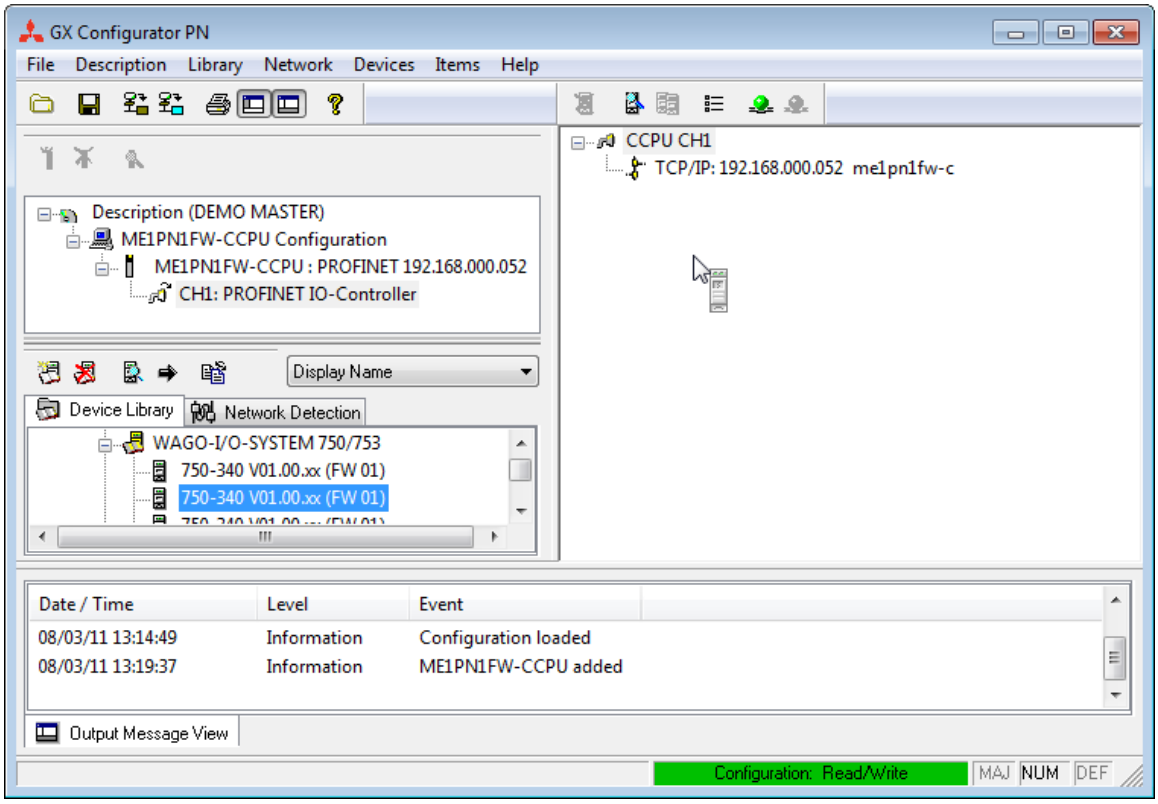
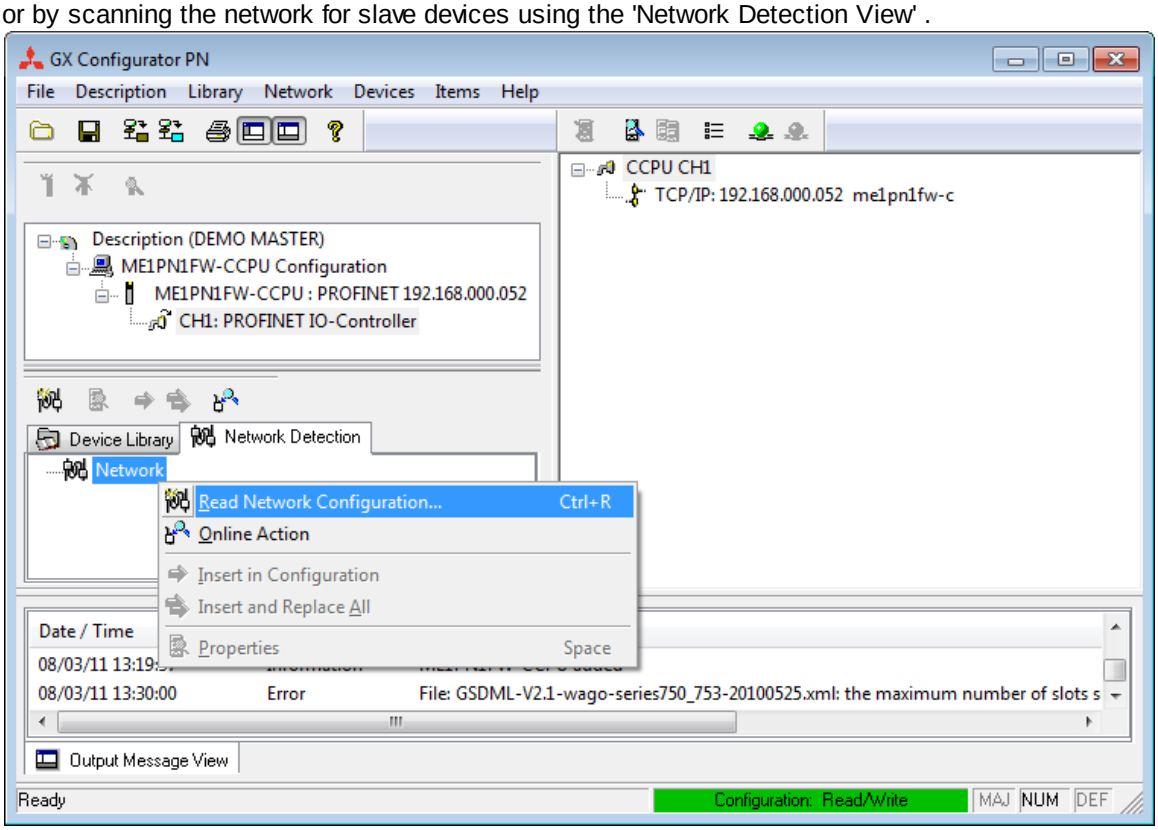



or by scanning the network for slave devices using the 'Network Detection View' .




4. the configuration of a slave can be edited by selecting 'Properties' from the context menu of the slave

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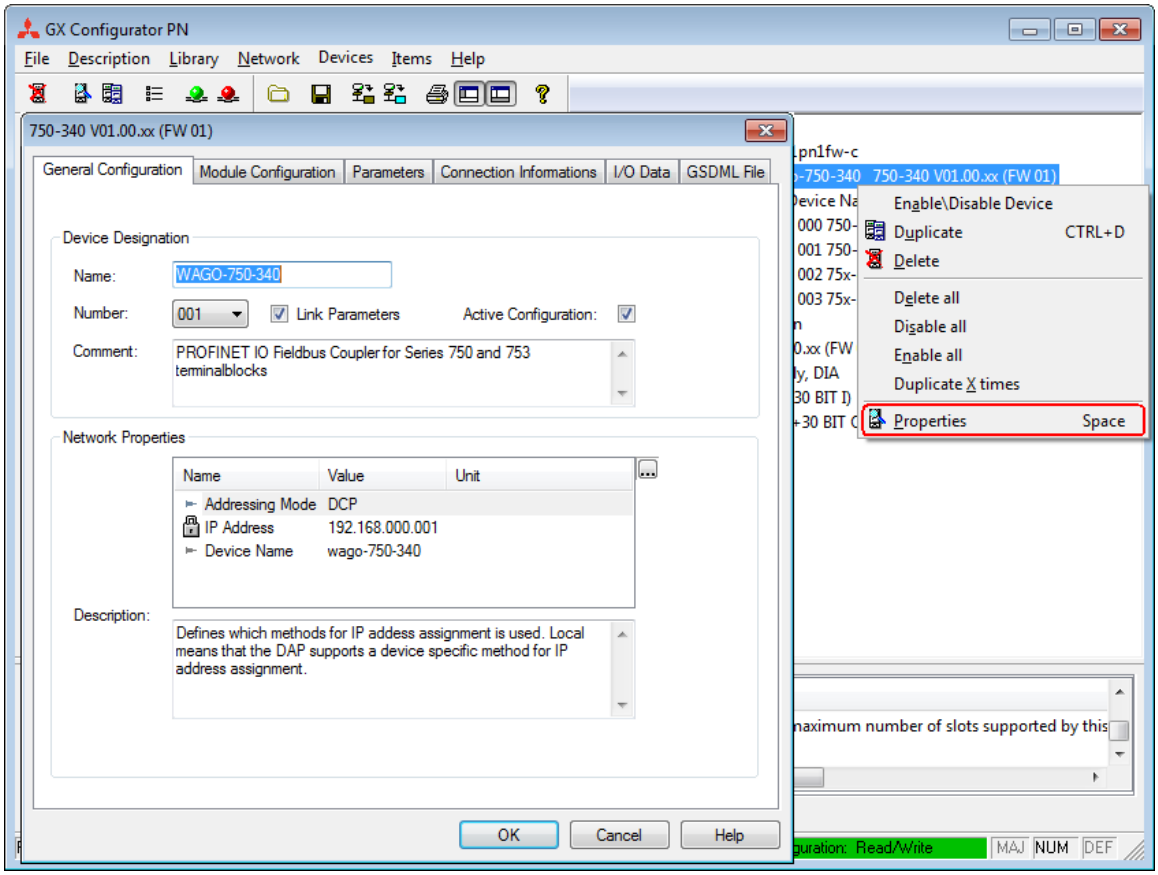
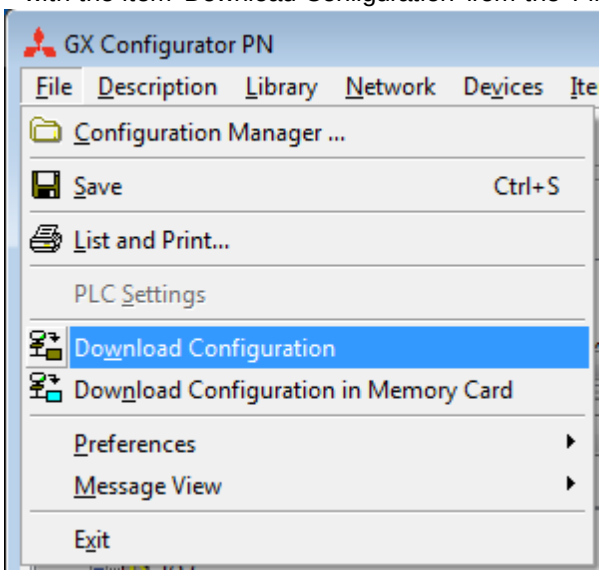



5. after completing the network settings the configuration can be downloaded to the ME1PN1FW-Q with the item 'Download Configuration' from the 'File' menu.

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# 6 Main Menu

## Starting GX Configurator-PN

Select GX Configurator-PN from the Windows Start menu. The default shortcut is

**Start -> Programs -> MELSOFT Applications -> GX Configurator-PN 1.02 -> GX Configurator-PN 1.02**

## Main menu

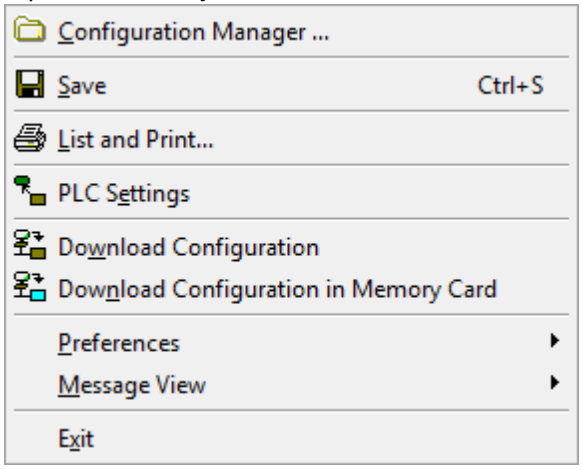
The main menu offers the following pull-down menus.

| Main Menu Items | Description |
|---|---|
| File | opening, saving and downloading configurations |
| Description | add/remove a PROFINET Controller |
| Library | managing the library with the device types |
| Network | functions related to scanning an existing network |
| Devices | adding/removing devices from/to the network |
| Items | configuring data items in device modules |
| Help | help and application information |

The items in the open pull-down menus can be reached via mouse or keyboard. The underlined character will start the function. In addition there are some menu items which may be started using predefined shortcuts.

# 6.1 File Menu

After having started the GX Configurator-PN software, this is the first menu to work with. With the help of this menu you can create a new or load an existing project.




The menu offers the following commands:

| Command | Description |
|---|---|

| | |
|---|---|
| **Configuration Manager** | Opens the project manager for selecting and managing configuration projects |
| **Save** | Save the current configuration |
| **List and Print** | Opens the ‘Preview and Print Listings’ dialog |
| **PLC Settings** | Opens the 'PLC Settings' dialog |
| **Download Configuration** | Download the configuration to the PROFINET controller |
| **Download Configuration in Memory Card** | Download the configuration to the memory card in the PROFINET controller |
| **Preferences** | Selects the user interface layout, active ‘Advanced Mode’ |
| **Message View** | Functions related to the ‘Message View’ |
| **Exit** | End application |

## Command 'Save'

This item saves the modifications of the current configuration.

## 'List and Print'

Opens the 'Preview or Print Listings' Dialog.

## Command 'PLC Settings'

The 'PLC Settings' dialog provides the user interface for configuring the data exchange between the PROFINET Controller and the controlling Qn-CPU. This includes

- assigning buffer devices
- updating refresh settings in Qn-CPU, PROFINET Controller and/or the PLC programming project
- checking existing refresh settings

For details see 'PLC Settings' dialog.

## Command 'Download Configuration'

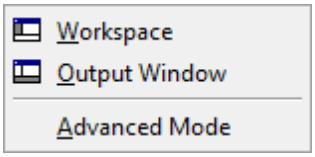
The current configuration is downloaded to the RAM of the PROFINET Controller.

Note: please make sure that the refresh settings for the interaction with the PLC program are consistent with the configuration of the PROFINET Controller by updating the refresh settings in the 'PLC Settings' dialog after a download of the PROFINET Controller configuration.

## Command 'Download Configuration in Memory Card'

The current configuration is downloaded to the CF-card inserted in the PROFINET Controller.

## Command 'Preferences'




| Command | Description |
|---|---|

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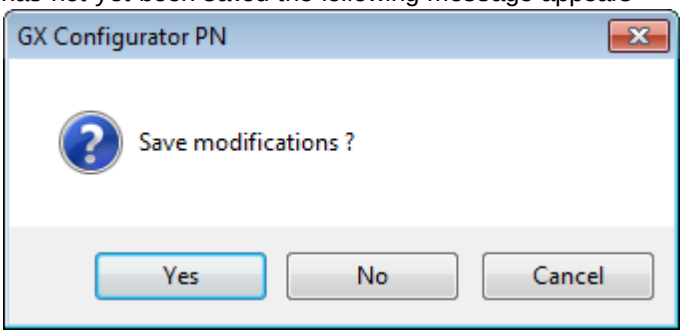
| | |
|---|---|
| Workspace | Toggles the display of the 'Configuration View', the 'Device Library View' and the 'Network Detection View' |
| Output Window | Toggles the display of the 'Message View' window |
| Advanced Mode | Toggles 'Advanced Mode' |

### Command 'Message View'

This item opens the 'Message View' menu.

### Command 'Exit'

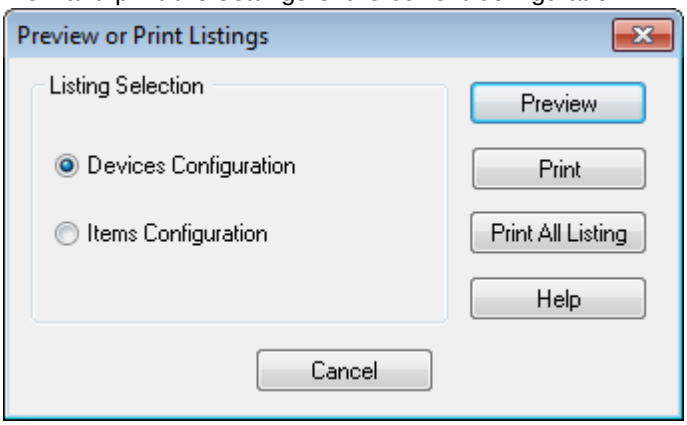
You can use this menu command to quit the software. If the configuration has been modified and has not yet been saved the following message appears




If you want to save the last changes before leaving and ending GX Configurator-PN choose **Yes**. If you choose **No**, all modifications to the respective project are lost.

## 6.1.1 'Preview or Print Listings' Dialog

View and print the settings of the current configuration.




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Devices Configuration | If selected, the I/O devices and their configuration are included in the printout | - | - |
| Items Configuration | If selected, the data items are included in the printout | - | - |
| Preview | Shows the contents of the selected configuration in the default text editor | - | - |

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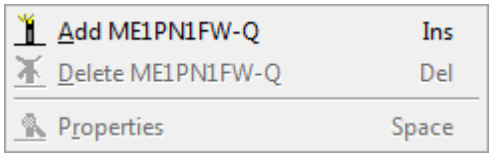
| | | | |
|---|---|---|---|
| Print | Prints the selected part of the configuration on the default printer | - | - |
| Print All Listing | Prints devices and items on the default printer | - | - |
| Help | Open online help | - | - |
| Cancel | Close the dialog | - | - |

## 6.2 Description Menu




The menu contains the following commands:

| Command | Description |
|---|---|
| Add ME1PN1FW-Q | Add PROFINET Controller to configuration |
| Delete ME1PN1FW-Q | Remove PROFINET Controller from configuration |
| Properties | Open 'Properties' dialog for PROFINET Controller |

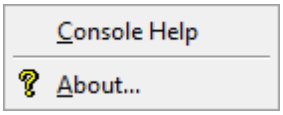
### Command 'Add ME1PN1FW-Q'

Add a ME1PN1FW-Q to the configuration

### Command 'Delete ME1PN1FW-Q'

Remove the ME1PN1FW-Q from the configuration

## 6.3 Help Menu




The menu contains the following commands:

| Command | Description |
|---|---|
| Console Help | Opens the online help |
| About | Displays version information |

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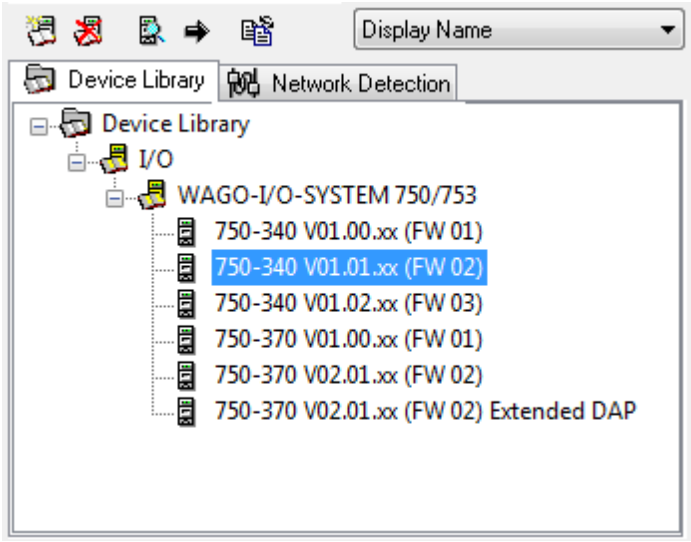
# 7 User Interface

## 7.1 Device Library

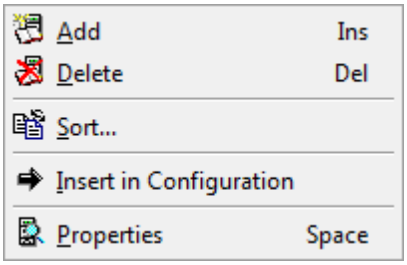
The device library is the local collection of descriptions for types of PROFINET I/O devices.




The parameters used for configuring an IO-Device are contained in a GSDML file (Generic Station Description Markup Language), commonly called a GSD. A GSD may contain one or more IO-Device descriptions.
The device library is used to store GSD files and to provide a graphic view. Using this graphic view, it is possible to manually insert IO-Devices into the current configuration. The device library is also accessed during automatic detection of IO-devices present on the network.

### Context Menu

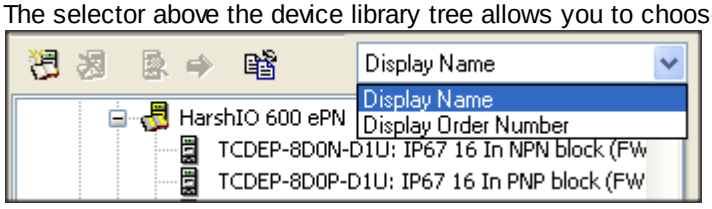
For the nodes in the device library tree context menus exists. The entries depend on the type of the selected node.




This menu is also accessible via the main menu. For a detailed description see 'Libray Menu'.

### Library Display Options

The selector above the device library tree allows you to choose the display mode.


Display Name
Display Name
Display Order Number
HarshIO 600 ePN
TCDEP-8D0N-D1U: IP67 16 In NPN block (FW
TCDEP-8D0P-D1U: IP67 16 In PNP block (FW

The available options are

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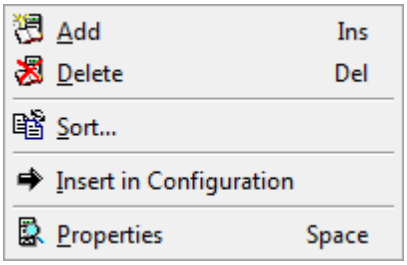
| | |
|---|---|
| Display Name | Display the product name |
| Display Order Number | Display the order number |

### Adding IO-Device Types to the Library

The 'GSDML Management' wizard lets you add one or more IO-Devices to the library. This wizard may be accessed via the button or via the menu item ‘Add…’ from the context menu of the device library or the ‘Library’ submenu in the main menu. For details see 'Add GSDML Files'.

## 7.1.1 Library Menu

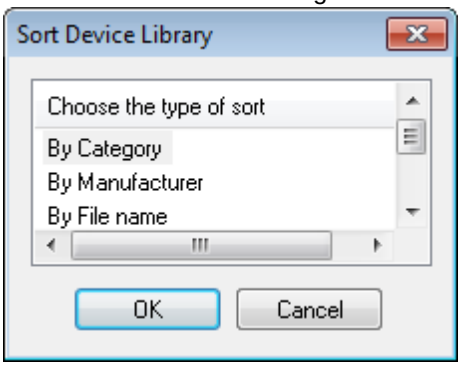



The menu contains the following commands:

| Command | Description |
|---|---|
| Add | Add device type with GSDML file to library |
| Delete | Remove device type from library<br>Device types must not be deleted while being used in the configuration.<br>**Note**: deleting a GSD from the library does not physically delete the GSD file on the hard disk. It is instead moved to the subdirectory 'removed_gsdml' |
| Sort | Sort the entries in the library |
| Insert in Configuration | Add selected device type to library |
| Properties | Show properties of the selected device type |

### Sort Device Library

Select the criteria for sorting the entries in the device library

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| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Choose the type of sort | Select the criteria for sorting the entries in the device library<br><br>Available sort keys are:<br><br>**By Category**: Displays IO-Devices according to their main type then their secondary type. This sort is based on the "Main Family" and "Product Family" fields in the GSD for the IO-Device.<br><br>**By Manufacturer**: Displays the IO-Device by manufacturer. This sort is based on the "VendorName" field in the GSD for the IO-Device.<br><br>**By File name**: Displays the IO-Devices according to the GSD filename.<br><br>**By IO-Device name**: Displays the IO-Devices by name. This sort is based on the "Name" field in the GSD for the IO-Device. | Category /<br>Manufacturer /<br>File name /<br>IO-Device name | Category |
| OK | Close dialog and save changes | | |
| Cancel | Close dialog and discard changes | | |

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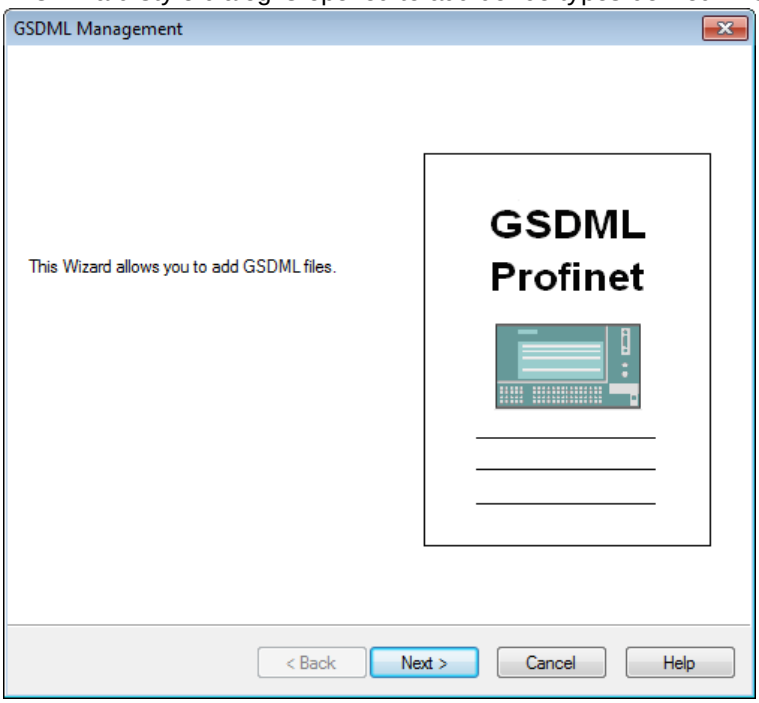
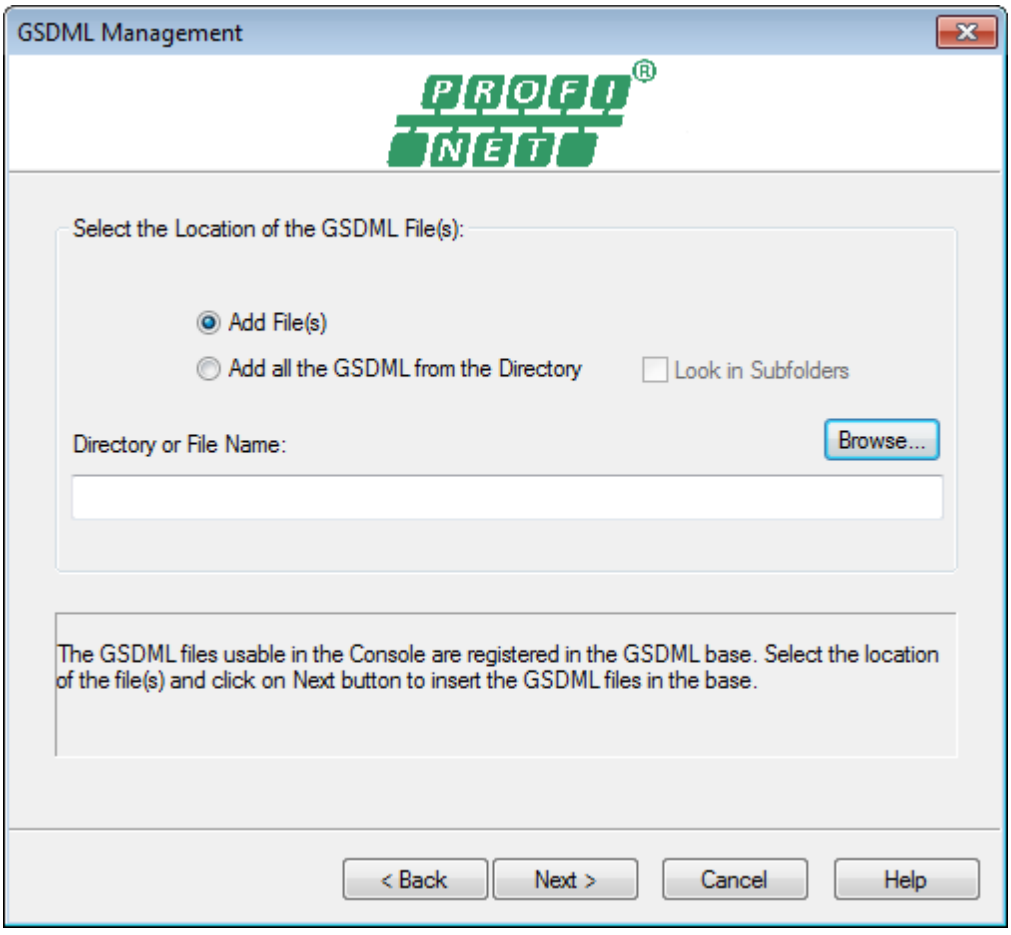
### 7.1.2 'GSDML Management' Dialog

This wizard-style dialog is opened to add device types defined in GSDML files to the device library.





GSDML Management
PROFI NET
Select the Location of the GSDML File(s):
Add File(s)
Add all the GSDML from the Directory
Look in Subfolders
Directory or File Name:
Browse...
The GSDML files usable in the Console are registered in the GSDML base. Select the location of the file(s) and click on Next button to insert the GSDML files in the base.
< Back
Next >
Cancel
Help

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| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Add File(s) | Add one or more GSDML files<br>Use the [Browse] button to select the files.<br>If the file already exists, the 'File Already Exists' warning is displayed. | Selected / not selected | Selected |
| Add all the GSDML from the Directory | Add the GSDML files in a specified directory and (optionally) its subdirectories<br>Use the [Browse] button to select the files.<br>If a file already exists, the 'File Already Exists' warning is displayed. | Selected / not selected | Not selected |
| Look in Subfolders | If selected, also the subfolders of the selected directory are searched for GSDML files. | Selected / not selected | Not selected |
| Directory or File Name | Path of the selected file(s) or directory | - | - |
| Browse | Open a file dialog for selecting the GSDML file(s) or the directory to search | - | - |
| Back | Go back to the start page | - | - |
| Next | Proceed and add the selected file or scan the selected directory | - | Default button |
| Cancel | Close wizard and discard changes | - | - |
| Help | Open online help | - | - |

### 'File Already Exists' Warning

If a file is to be added, which already exists in the library, a warning is displayed. The existing type is not overwritten. If it should be replaced, the existing entry must be deleted first.

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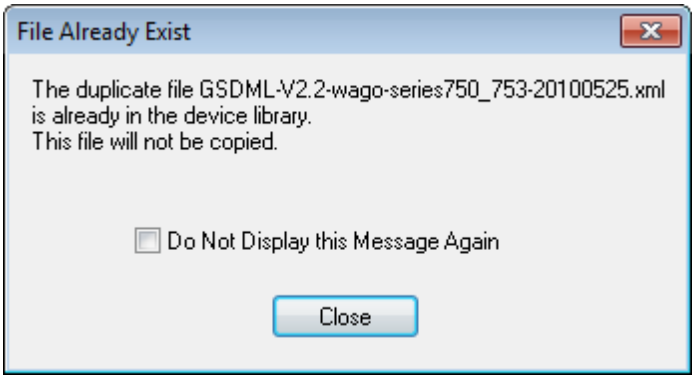
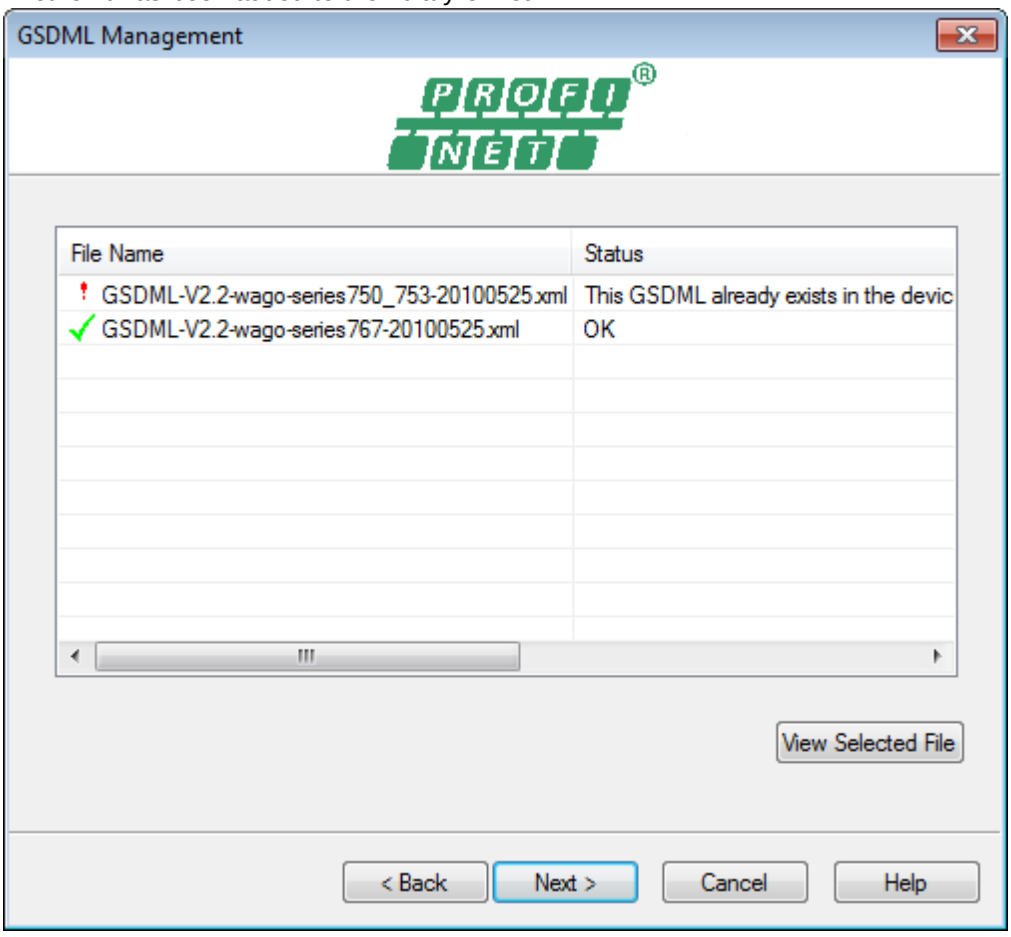

File Already Exist
The duplicate file GSDML-V2.2-wago-series750_753-20100525.xml
is already in the device library.
This file will not be copied.
Do Not Display this Message Again
Close

## 'Add GSD File Completed' Page

After adding one or several GSD files to the library, the next page shows for each selected GSD file, whether it has been added to the library or not.




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Column 'File Name' | Name of GSDML file | - | - |
| Column 'Status' | Status (added or failure) | - | - |
| Columns 'Family Name', 'Schema | Additional information taken from the GSDML file | - | - |

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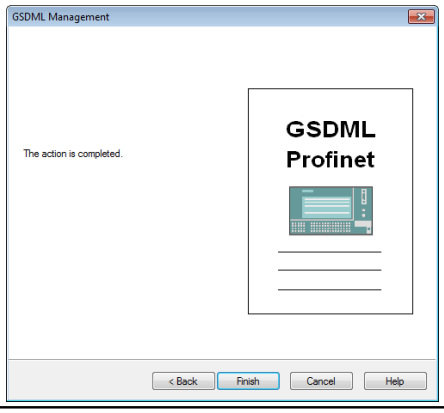
| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Version', 'Manufacturer', 'File Date' and 'File Time' | | | |
| View Selected File | Open the selected GSDML file in the default text editor | - | - |
| Back | Go back to the previous page | - | - |
| Next | Proceed to the next page to end the wizard   | - | Default button |
| Cancel | Close wizard and discard changes | - | - |
| Help | Open online help | - | - |

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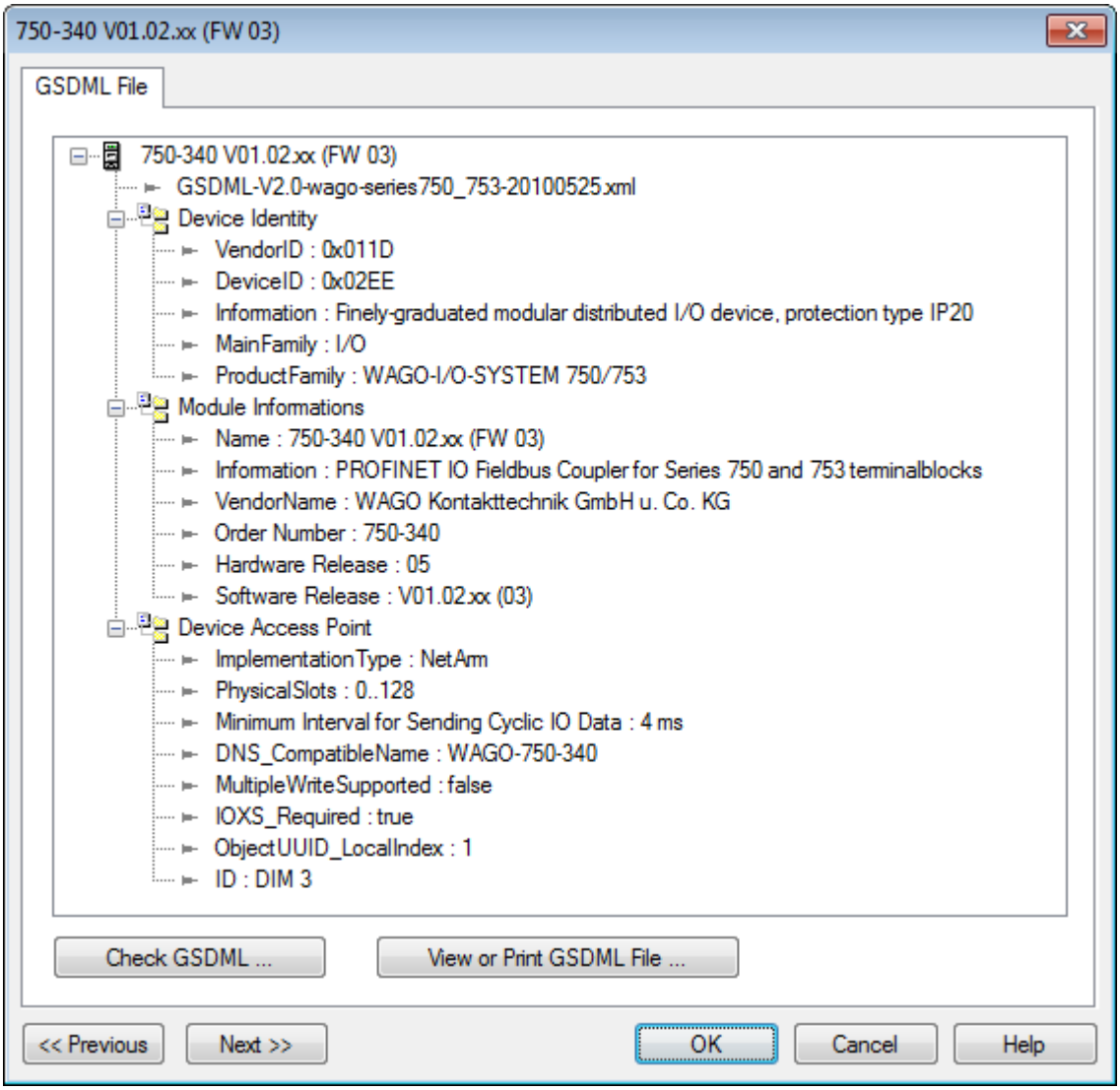
### 7.1.3 'Device Type Properties' Dialog




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Tree | Structured display of the GSD file contents | - | - |
| Check GSDML | Checks, whether GSD file contents comply to the specification (i.e. schema definition) | - | - |
| View or Print GSDML File | Displays the GSD file contents in the default text editor, from they can be saved or printed | - | - |
| Previous | Show properties of previous device | Disabled, if the device is the first in the list | - |

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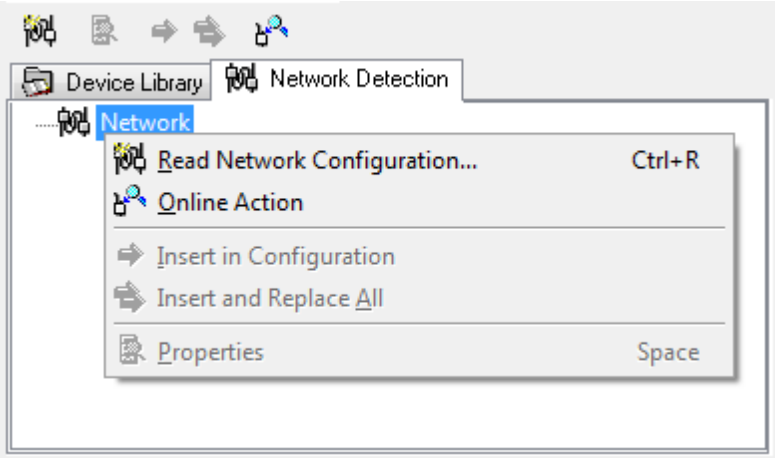
| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Next | Show properties of next device | Disabled, if the device is the last in the list | - |
| OK | Close dialog and save changes | - | - |
| Cancel | Close dialog and discard changes | - | - |
| Help | Open online help | - | - |

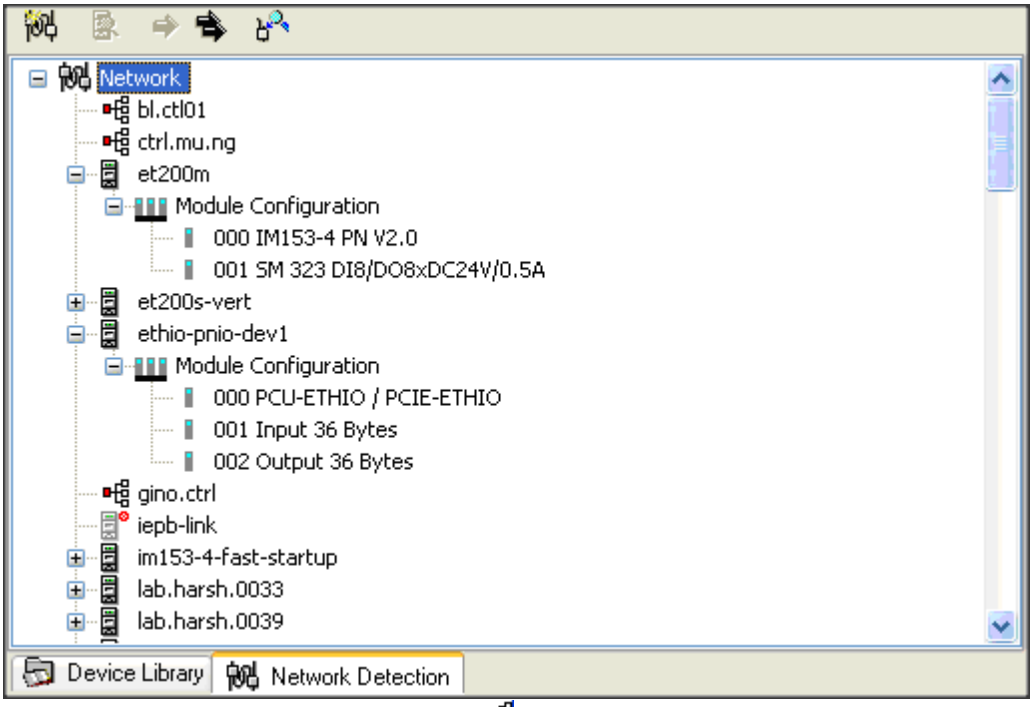
## 7.2 Network Detection

Instead of manually adding device types to the network configuration the user can scan the network of the PROFINET Controller for connected devices and one or several of these devices to the current network configuration.




The context menu of the 'Network' node corresponds to the 'Network Menu' in the main menu.

### Network Tree




Network components with icons like this: are IO-Controllers They cannot be used in the current configuration.

Network detection will carry out an implicit read request to the IO-Device to find out the configuration of the IO-Device's slots and sub-slots. Certain IO-Devices do not support this request and must therefore be configured manually.

The message window contains all the IO-Devices, whose name or current IP address are not compatible with network detection from GX Configurator-PN.
IO-Devices with an IP address, which is not of the same class as that of the IO-Controller, are represented like this: They cannot be inserted into the current configuration.

For PROFINET network detection to be as effective as possible, the following rules must be obeyed:

- Each IO-Device must have a unique name
  PROFINET uses DCP protocol to address the IO-Devices. This protocol allows a name to be given to each IO-Device. As for the IP address, the name must be unique over the network. To name an IO-Device, it is recommended to use the 'Online Action Tool'.

- Each IO-Device must have one IP address in the same network range as the IO-Controller.
  When an IO-Device is detected, an implicit read request is carried out to find out the slot/sub-slot configuration of the IO-Device. This request uses RPC protocol based on TCP/IP. If the IO-Device is not in the same network range as the IO-Controller, then this request will fail. To configure an IP address for an IO-Device, it is recommended to use the 'Online Action Tool'.

- Each IO-Device must have its GSD present in the device library.
  The configuration of an IO-Device is based on its GSD. Without a GSD file an IO-Device cannot be configured.

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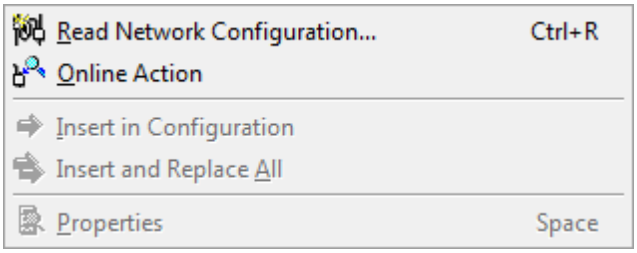
### 7.2.1 'Network' Menu

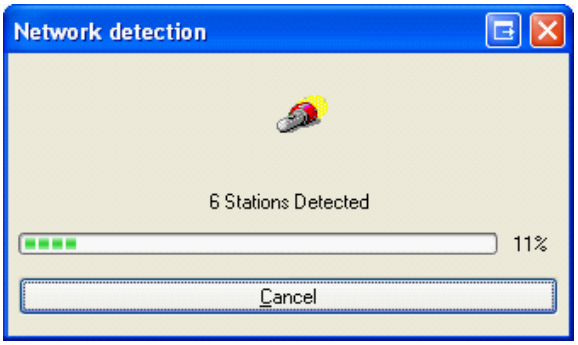



The menu contains the following commands:

| Command | Description |
|---|---|
| Read Network Configuration | Scans the network for connected devices |
| Online Action | Starts the 'Online Action' tool for finding and identifying devices and for setting device name and/or IP address |
| Insert in Configuration | Adds the selected device to the current network configuration |
| Insert and Replace All | Removes the devices currently configured and adds all devices found |
| Properties | Opens the view with the properties of the selected device |

#### Command 'Read Network Configuration'

This command scans the network for connected devices.




Alternatively the button can be pressed. The devices found are listed in the [Network Detection] area.

#### Command 'Online Action'

Starts the 'Online Action' tool for finding and identifying devices and for setting device name and/or IP address.

#### Command 'Insert in Configuration'

Adds the selected device to the current network configuration.

#### Command 'Insert and Replace All'

Removes the devices currently configured and adds all devices found.

#### Command 'Properties'

Opens the view with the properties of the selected device.

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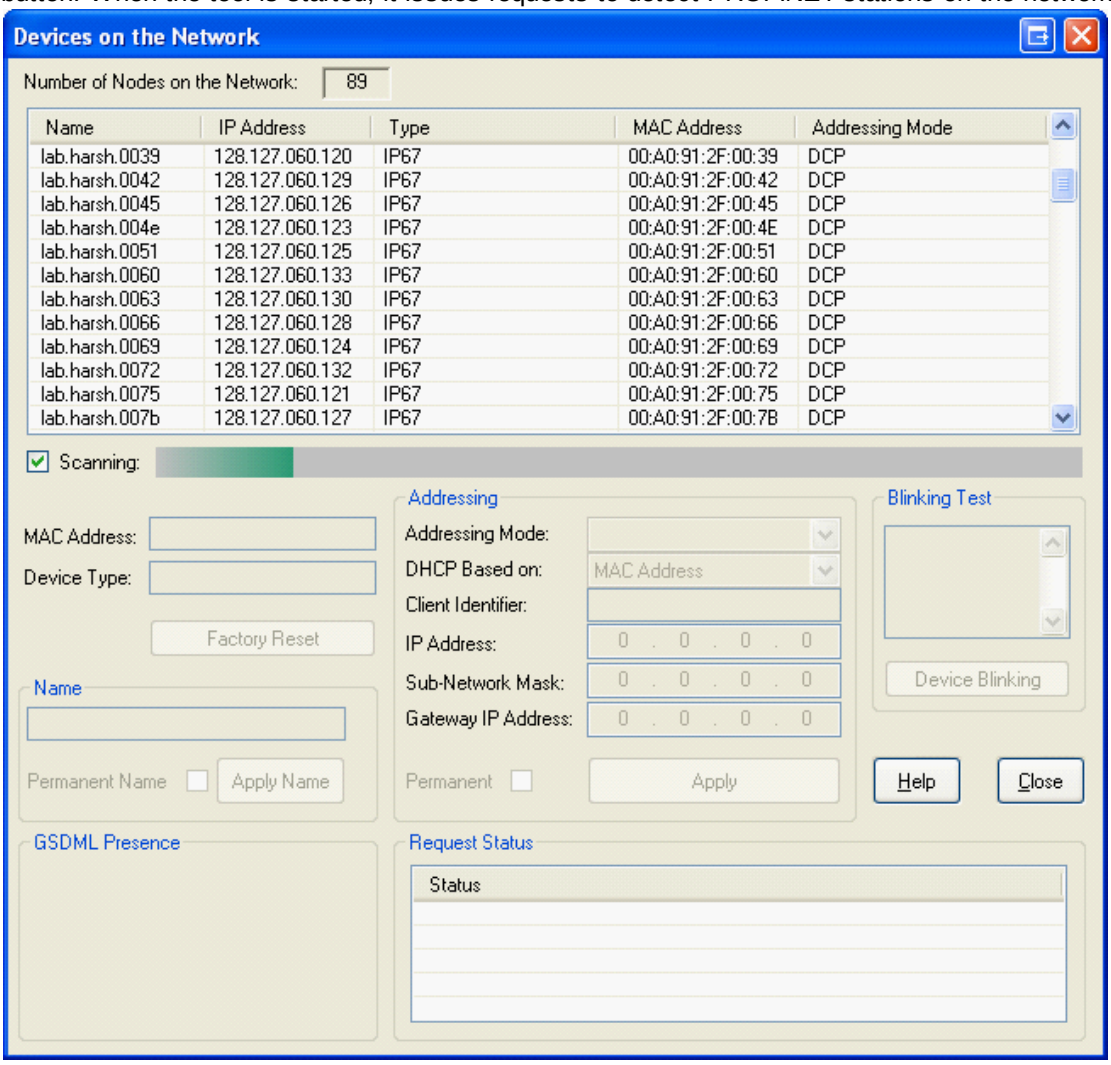
### 7.2.2 Online Action Tool

The 'Online Action' tool is started via either the menu item 'Online Action' or by pressing the button. When the tool is started, it issues requests to detect PROFINET stations on the network.




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Number of Nodes on the Network | Number of network nodes found | - | - |
| Network Nodes Table | Shows the PROFINET stations present as well as their name, IP address, type, MAC address and addressing mode | - | - |
| Scanning | If checked, the network nodes list is refreshed every 3 seconds. Otherwise the list is not refreshed again. | - | - |
| MAC Address | Ethernet address of the selected device | - | - |

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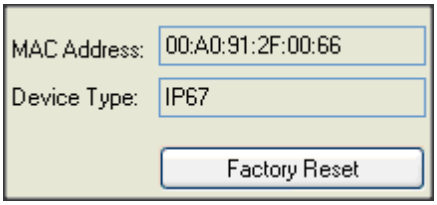
| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Device Type | Type of the selected device | - | - |
| Factory Reset | Sends a DCP request to the IO-Device telling it to restart with its factory default settings. The result of this command will be displayed in the Request status field<br>  | - | - |
| Name | Name of the selected device | - | - |
| Permanent Name | Checked: the IO-Device is to store its new name in non-volatile memory. After the next power cycle the device must use its new name.<br>Unchecked: the IO-Device is to store its new name in volatile memory. After the next power cycle the device goes back to its old name. | - | - |
| Apply Name | Sends a DCP request to the IO-Device telling it to use its new name.<br>The result of this command will be displayed in the Request status field.<br>For further information see 'Naming an IO-Device'. | - | - |
| Addressing Mode | There are three available addressing modes:<br>**DCP**: the IO-Controller may change the TCP/IP configuration of the device. The IO-Controller will change the TCP/IP configuration of the IO-Device if it differs from the TCP/IP configuration of the IO-Device contained in the IO-Controller configuration.<br>**DHCP**: In this mode, the IO-Device obtains its TCP/IP configuration from a DHCP server. The criterion for obtaining the TCP/IP configuration from the DHCP server is configurable in the 'DHCP Based on' list.<br>**Note**: if an IO-Device is configured in DHCP mode and a connection is established, the IO-Controller compares the TCP/IP configuration of the IO-Device with that contained in the configuration of the IO-Controller. If they differ, the connection cannot be established. | - | - |

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| Name | Description | Choices / Range | Default |
|---|---|---|---|
| DHCP Based on | **MAC address**: the identifier used for obtaining the IP configuration from the DHCP server will be the MAC address of the IO-Device.<br>**Station name**: the identifier used for obtaining the IP configuration from the DHCP server will be the name of the IO-Device.<br>**Client identifier**: the identifier used for obtaining the IP address from the DHCP server will be the character string entered by the user in the [Client Identifier] field.<br>**Local**: This parameter cannot be selected. It is there for information only if the IO-Device is already set to local mode. | - | - |
| Client Identifier | The identifier used for obtaining the IP address from the DHCP server | - | - |
| IP Address | IP address to be set in the device | - | - |
| Sub-Network Mask | Sub-network mask to be set in the device | - | - |
| Gateway IP Address | Gateway IP address to be set in the device | - | - |
| Permanent | Checked: the IO-Device is to store its new IP configuration in non-volatile memory. When it is next turned on, it must use its new IP configuration.<br>Unchecked: the IO-Device is to store its new IP configuration in volatile memory. When it is next turned on, it must use its new IP configuration. | - | - |
| Apply | Sends a DCP request to the IO-Device for it to use its new TCP/IP configuration.<br>The result of this command will be displayed in the Request status field.<br>For further information see 'Configure the IP Address of an IO-Device' | - | - |
| Blinking Test | If the GSDML file of the selected device exists in the device library and contains the 'DCP_FlashOnceSignalUnit' tag, the text from the GSDML file indicates the device behaviour when it receives a DCP flash command. | - | - |
| Device Blinking | The 'Blinking Device' dialog is displayed and DCP blink commands are sent to the device. | - | - |

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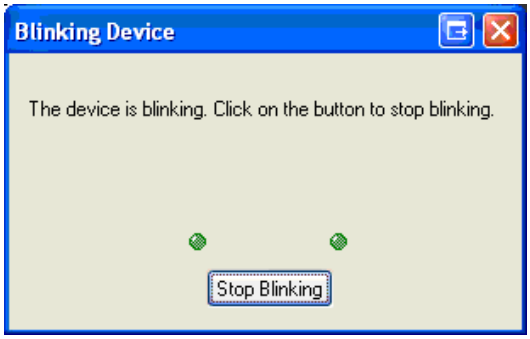
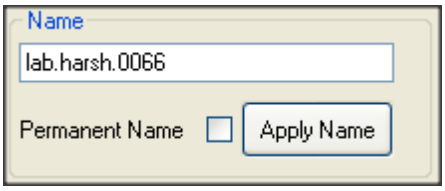
| Name | Description | Choices / Range | Default |
|---|---|---|---|
| |  | | |
| Help | Open online help | - | - |
| Close | Close dialog | - | Default button |
| Request Status | Lists the results of the commands issued in this dialog | - | - |

## Naming an IO-Device

When an IO-Device is selected from the list, the name of the selected IO-Device is shown in the Name field and the Write to device button is enabled.




This command sends a DCP request to the IO-Device telling it to use its new name.
The Permanent name checkbox is used as follows:

- Checked: the IO-Device is to store its new name in non-volatile memory. When it is next turned on, it must use its new name.
- Unchecked: the IO-Device is to store its new name in volatile memory. When it is next turned on, it goes back to its old name.

The result of this command will be displayed in the Request status field.

### Naming rules for an IO-Device

The name of an IO-Device is made up of 1 to 240 characters and must comply with the following rules:

- 1 or more labels separated by [.]
- the size of a label varies from 1 to 63 characters
- total size (sum of all label and [.] character) varies from 1 to 240 characters
- the allowed characters are [a-z0-9], upper-case letters are prohibited
- labels may not start with [-]
- labels may not terminate with [-]
- labels may not start with [port-xyz] or [port-xyz-abcde] where a,b,c,d,e,x,y,z = 0..9

## Configure the IP Address of an IO-Device

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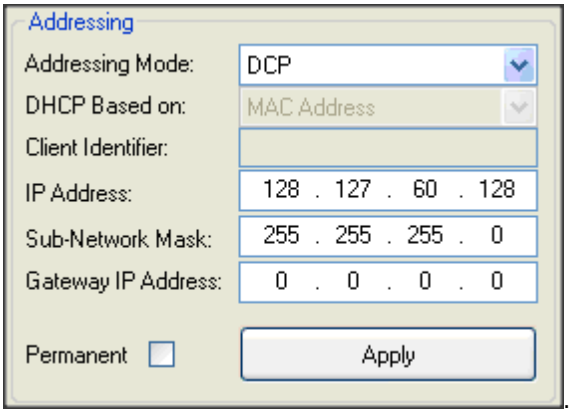
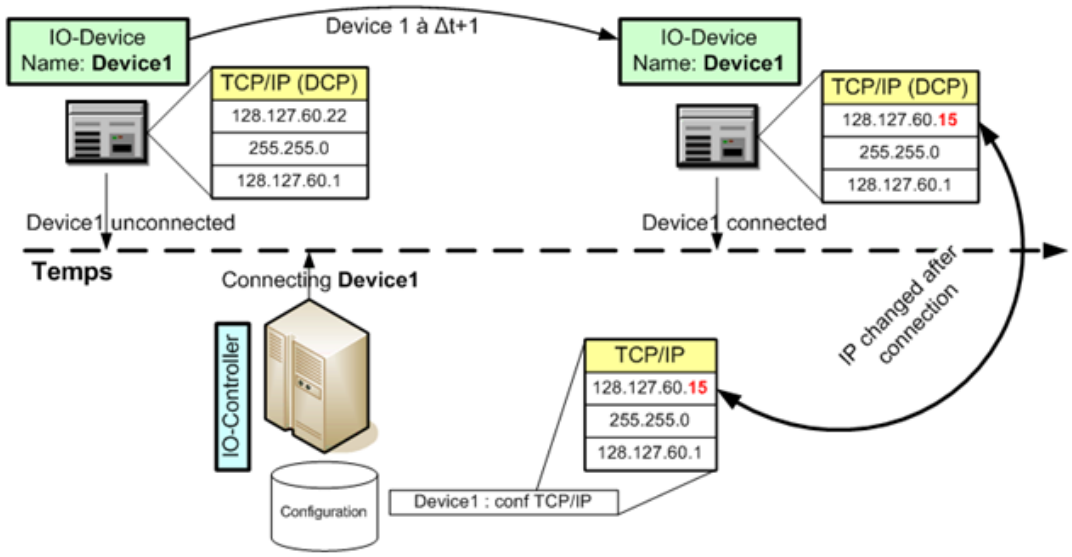
When an IO-Device is selected from the list, the TCP/IP configuration of the selected IO-Device is shown in the addressing field and the [Apply] button is enabled.




There are three available addressing modes:

- **DCP**: In this mode, although the IO-Device has a TCP/IP configuration, when an IO-Controller connects to this IO-Device, the IO-Controller may change the TCP/IP configuration of this IO-Device. The IO-Controller will change the TCP/IP configuration of the IO-Device if it differs from the TCP/IP configuration of the IO-Device contained in the IO-Controller configuration.




- **DHCP**: In this mode, the IO-Device obtains its TCP/IP configuration from a DHCP server. The criterion for obtaining the TCP/IP configuration from the DHCP server is configurable. The DHCP based on gives the following options:

  *MAC address*: the identifier used for obtaining the IP configuration from the DHCP server will be the MAC address of the IO-Device.
  *Station name*: the identifier used for obtaining the IP configuration from the DHCP server will be the name of the IO-Device.
  *Client identifier*: the identifier used for obtaining the IP address from the DHCP server will be the string entered in the client identifier field.

  If an IO-Device is configured in DHCP mode: when a connection is established, the IO-Controller compares the TCP/IP configuration of the IO-Device with that contained in the configuration of

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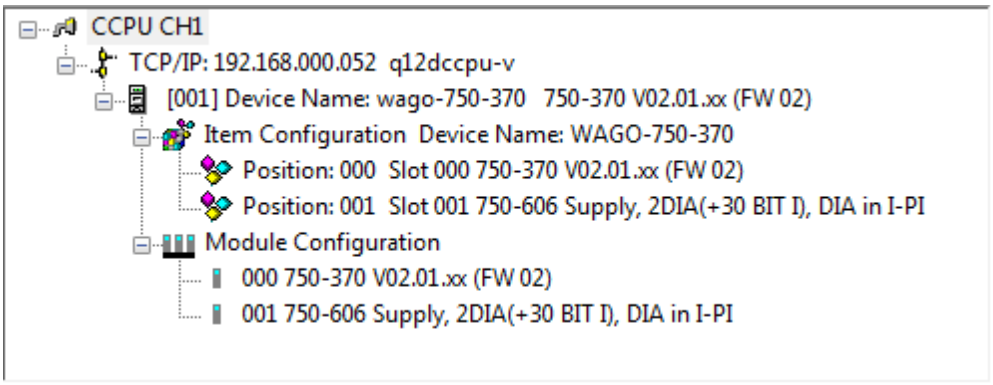
the IO-Controller. If they differ, the connection cannot be established.

- **Local**: This parameter cannot be selected. It is there for information only if the IO-Device is already set to local mode.

## 7.3 PROFINET Network View

The PROFINET network view is the central view of the application. It lists

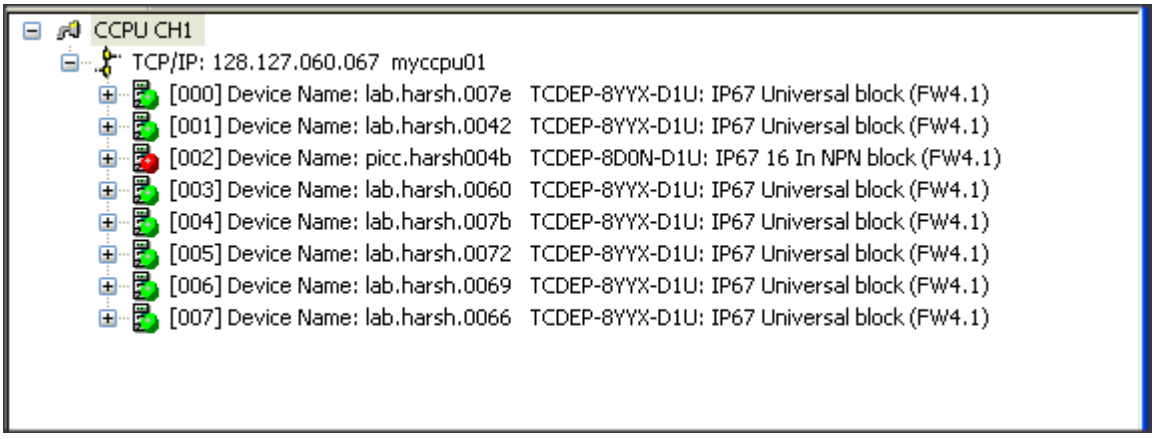
- PROFINET controller
- assigned I/O devices
- modules of the I/O devices


CCPU CH1
TCP/IP: 192.168.000.052 q12dccpu-v
[001] Device Name: wago-750-370 750-370 V02.01.xx (FW 02)
Item Configuration Device Name: WAGO-750-370
Position: 000 Slot 000 750-370 V02.01.xx (FW 02)
Position: 001 Slot 001 750-606 Supply, 2DIA(+30 BIT I), DIA in I-PI
Module Configuration
000 750-370 V02.01.xx (FW 02)
001 750-606 Supply, 2DIA(+30 BIT I), DIA in I-PI

Operations for the network view are contained in the 'Devices' Menu.

### Diagnostic Mode

The diagnostic mode is activated with the menu item 'Start Console Diagnostic' or by pressing the button.


CCPU CH1
TCP/IP: 128.127.060.067 myccpu01
[000] Device Name: lab.harsh.007e TCDEP-8YYX-D1U: IP67 Universal block (FW4.1)
[001] Device Name: lab.harsh.0042 TCDEP-8YYX-D1U: IP67 Universal block (FW4.1)
[002] Device Name: picc.harsh004b TCDEP-8D0N-D1U: IP67 16 In NPN block (FW4.1)
[003] Device Name: lab.harsh.0060 TCDEP-8YYX-D1U: IP67 Universal block (FW4.1)
[004] Device Name: lab.harsh.007b TCDEP-8YYX-D1U: IP67 Universal block (FW4.1)
[005] Device Name: lab.harsh.0072 TCDEP-8YYX-D1U: IP67 Universal block (FW4.1)
[006] Device Name: lab.harsh.0069 TCDEP-8YYX-D1U: IP67 Universal block (FW4.1)
[007] Device Name: lab.harsh.0066 TCDEP-8YYX-D1U: IP67 Universal block (FW4.1)

After configuring the IO-Controller, adding and configuring the devices of your network and downloading your configuration to the board, the statuses of all devices can be tested with the internal diagnostic tool. This tool gives a first level diagnosis of the status of the current configuration. When the diagnostic mode is enabled, the configuration cannot be changed. It is in read-only mode.
Once enabled, the diagnostic view shows the current status of the connection for each IO-Device.

Indicates that the IO-Device is connected

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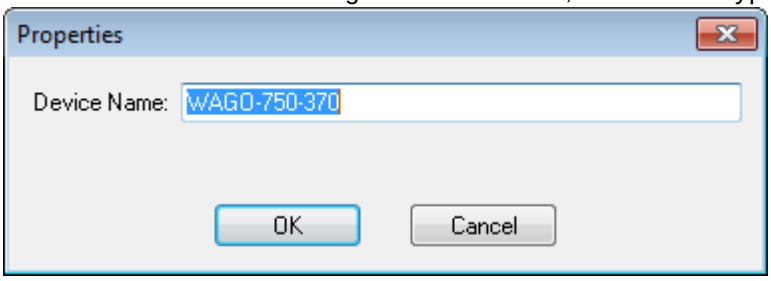
Indicates that the IO-Device is disconnected but that a connection phase is under way

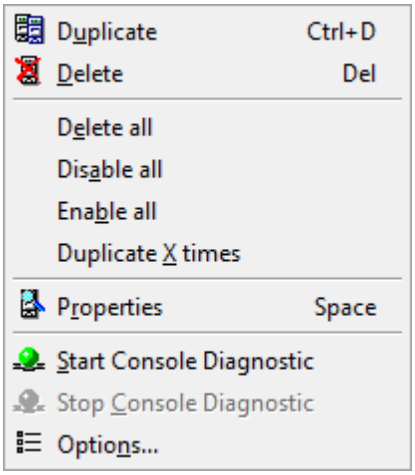
Indicates that the IO-Device is not connected. Connection is controlled by the user

### 'Device Name Properties' Dialog

The device name can be changed from its default, which is the type name taken from the GSD file.




## 7.3.1 'Devices' Menu




The menu contains the following commands:

| Command | Description |
|---|---|
| Duplicate | Add a copy of the selected device |
| Delete | Remove the selected device |
| Delete all | Remove all devices |
| Disable all | Disable all devices |
| Enable all | Enable all devices |
| Duplicate X times | Add multiple copies of the selected device |
| Properties | If the PROFINET Controller is selected:<br>opens the 'PROFINET Controller Properties' dialog<br>If an IO device is selected:<br>opens the 'PROFINET I/O Device Properties' dialog |
| Start Console Diagnostic | Start diagnostic mode |
| Stop Console Diagnostic | Stop diagnostic mode |

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| Command | Description |
|---|---|
| Options | Opens the 'Display Option' dialog |

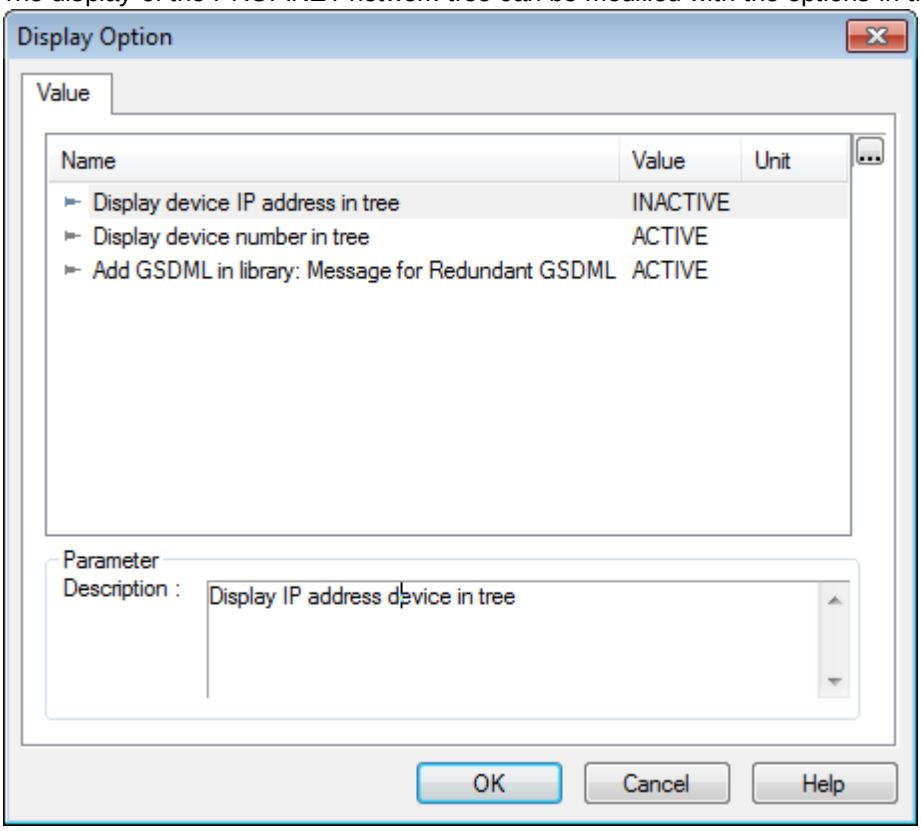
### Properties

The effect of this menu item depends on the node, which is selected in the network tree.

| Node Type | Properties Dialog |
|---|---|
| Channel | 'Channel Properties' Dialog |
| PROFINET Controller | 'ME1PN1FW-Q Properties' Dialog |
| IO-Device | 'IO-Device Configuration' Dialog |
| Item Configuration - Device | PROFINET Network View - 'Device Name Properties' Dialog |
| Item Configuration - Slot | 'Items Declaration' Dialog |
| Module Configuration | 'IO-Device Configuration' Dialog - Tab 'Module Configuration' |
| Module Name | 'Module Configuration' Dialog |

## 7.3.2 'Display Option' Dialog

The display of the PROFINET network tree can be modified with the options in this dialog.



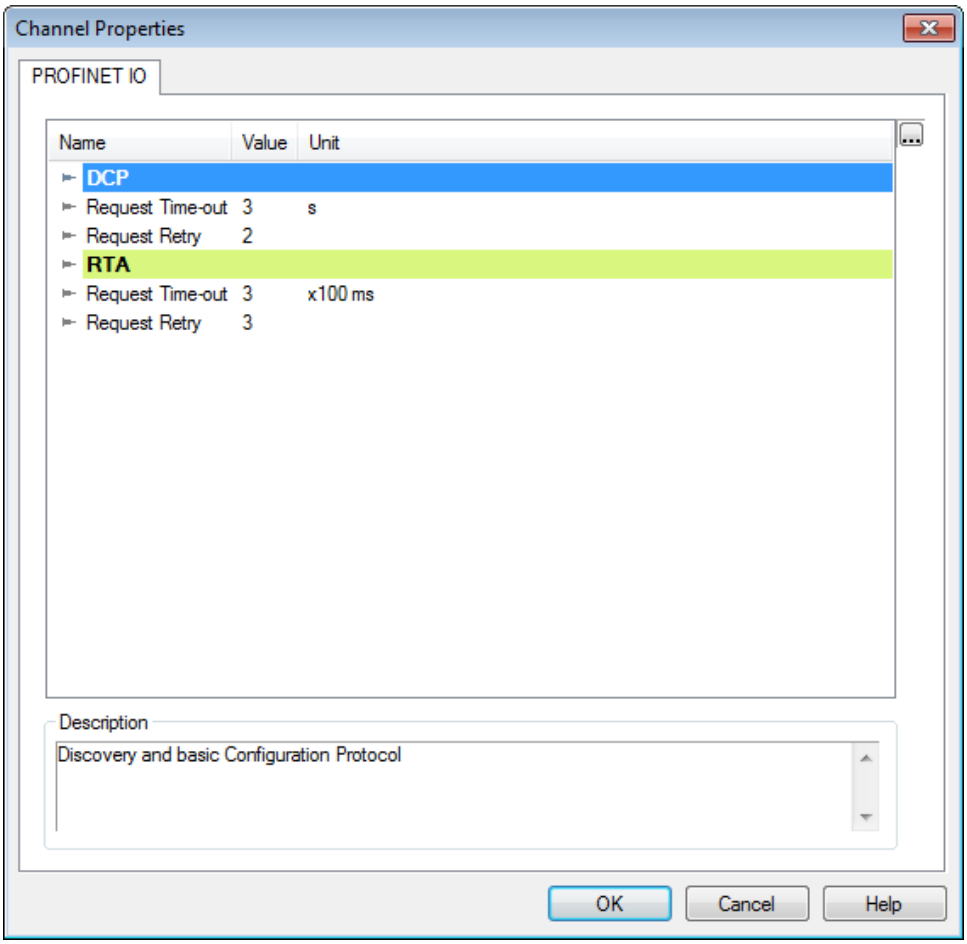

| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Display device IP | If enabled, displays the IP address of the device | Active / | Inactive |

| Name | Description | Choices / Range | Default |
|---|---|---|---|
| address in the tree | in the current configuration tree. | Inactive | |
| Display device number in the tree | If enabled, displays the number of the device in the current configuration tree. | Active / Inactive | Active |
| Add GSDML in library: Message for redundant GSDML | If enabled, displays a message if a GSDML file for the same device with the same file version is already in the GSDML database. This GSDML file will not be inserted into the device library. | Active / Inactive | Active |
| Parameter Description | Shows a descriptive text to the selected parameter | Read-only | - |
| OK | Close dialog and save changes | - | Default button |
| Cancel | Close dialog and discard changes | - | - |
| Help | Open online help | - | - |

### 7.3.3 'Channel Properties' Dialog

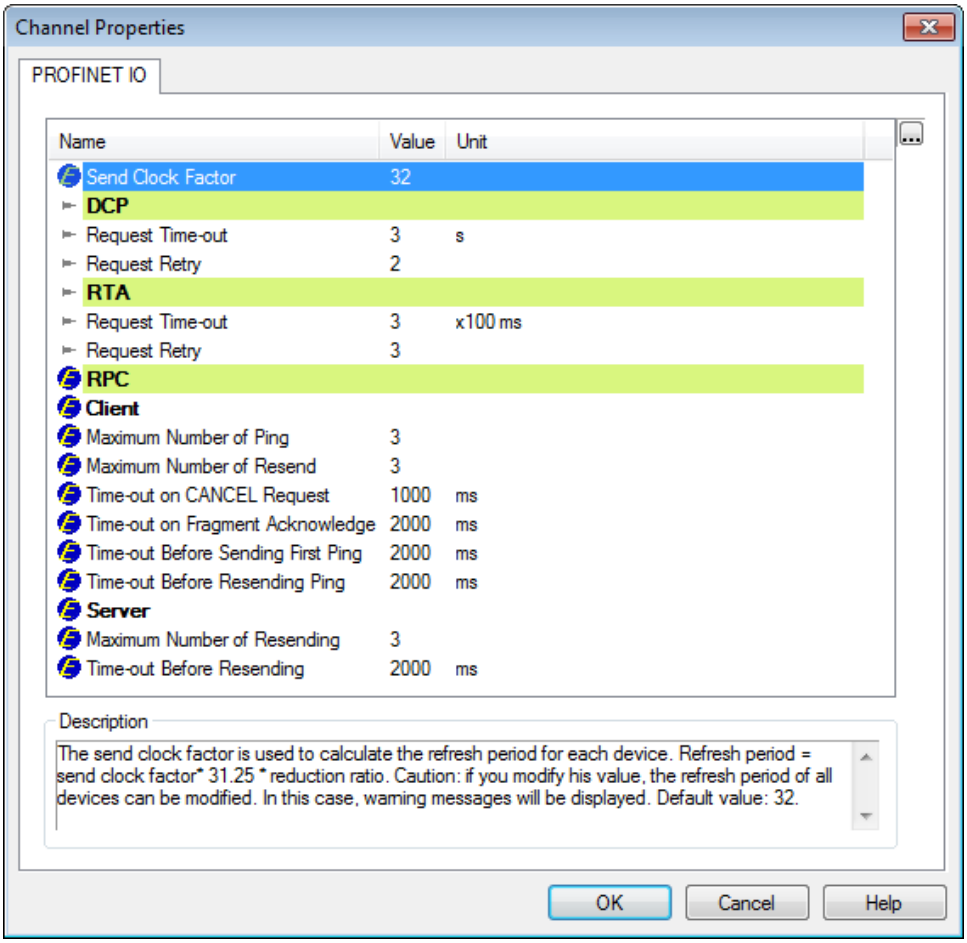
This dialog provides access to timing parameters for the PROFINET I/O communication. The displayed values depend on whether 'Advanced Mode' has been selected or not.

In 'Standard Mode':



| DCP section | |
|---|---|
| **Request time-out** | Sets the maximum time from the IO-Controller sending a DCP request from the reply. It also sets the listening time of the IO-Controller to the DCP identification request |
| **Number of request retries** | Sets the maximum number of times a DCP request is repeated following a timeout. |
| **RTA (Real Time with Acknowledgment) section** | |
| **Request time-out** | Sets the maximum period separating the time from the IO-Controller sending a RTA request and the reply. |
| **Number of request retries** | Sets the maximum number of times an RTA request is repeated following a timeout. |

In 'Advanced Mode':


Channel Properties
PROFINET IO
Name
Value
Unit
Send Clock Factor 32
DCP
Request Time-out 3 s
Request Retry 2
RTA
Request Time-out 3 x100 ms
Request Retry 3
RPC
Client
Maximum Number of Ping 3
Maximum Number of Resend 3
Time-out on CANCEL Request 1000 ms
Time-out on Fragment Acknowledge 2000 ms
Time-out Before Sending First Ping 2000 ms
Time-out Before Resending Ping 2000 ms
Server
Maximum Number of Resending 3
Time-out Before Resending 2000 ms
Description
The send clock factor is used to calculate the refresh period for each device. Refresh period = send clock factor* 31.25 * reduction ratio. Caution: if you modify his value, the refresh period of all devices can be modified. In this case, warning messages will be displayed. Default value: 32.
OK
Cancel
Help

| RPC section - Client | |
|---|---|
| Maximum number of pings | Sets the maximum number of pings while awaiting a response. |
| Maximum number of re-sends | Sets the maximum number of times an RPC frame is repeated (question or response). |
| Timeout on CANCEL request | Sets the maximum time from the IO-Controller sending an RPC cancel request to the reply. |

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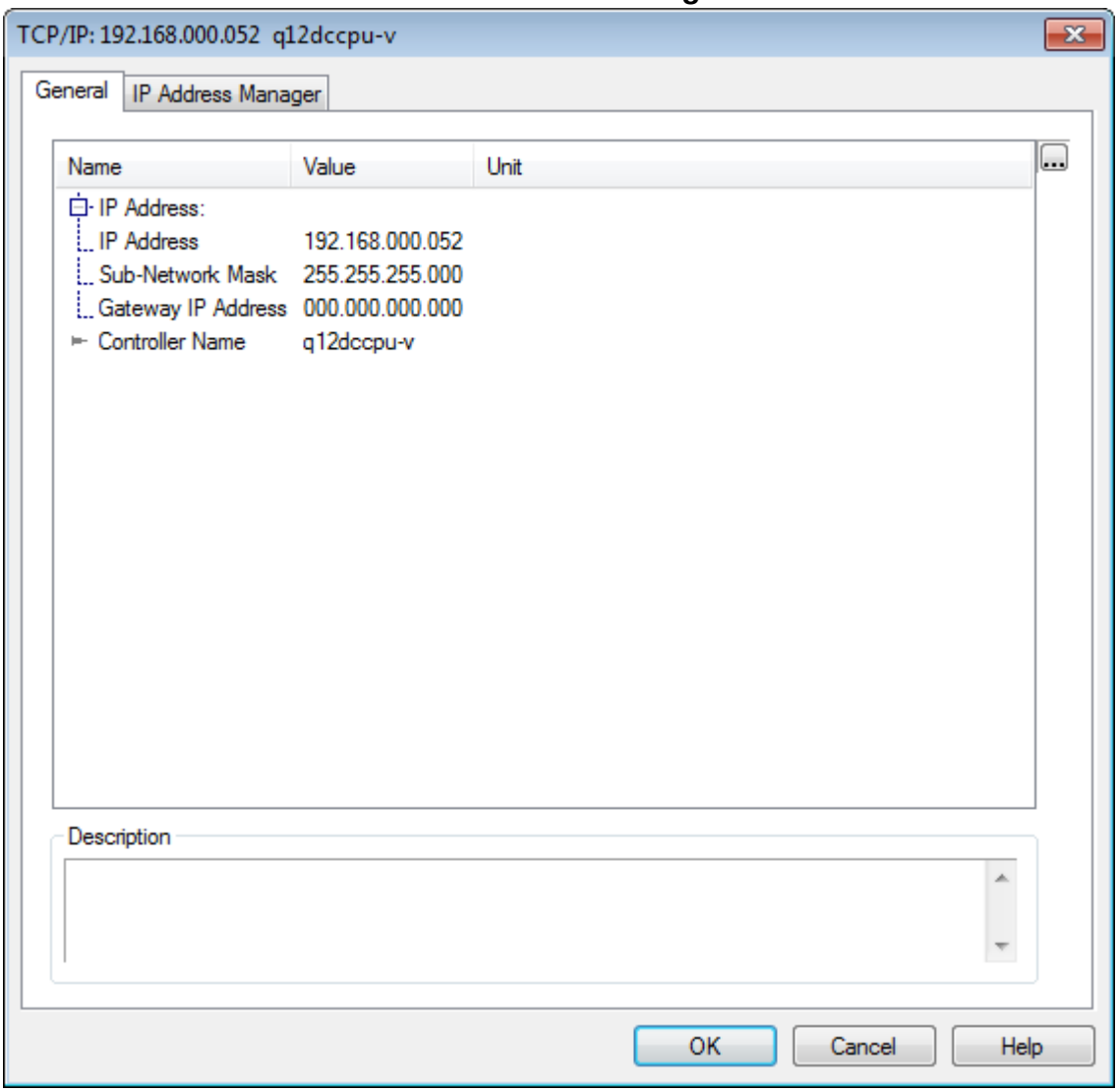
| | |
|---|---|
| Timeout on Fragment Acknowledge | Sets the maximum time separating the IO-Controller sending an RPC ACK request from the reply. |
| Timeout on sending first ping | Sets the maximum time separating the IO-Controller sending the first RPC PING request from the reply. |
| Timeout on resending first ping | Sets the maximum time separating the IO-Controller sending an RPC PING request from the response to the first PING. |
| **RPC section - Server** | |
| Maximum number of re-sends | Maximum times a telegram is retransmitted before signalling an error. |
| Timeout before resending | Interval to wait before retransmitting a telegram. |

### 7.3.4 IP Address Manager

This dialog provides access to the network address settings of the PROFINET Controller and to the 'IP Address Manager'.

#### PROFINET Controller Network Address Settings



| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Table | **IP Address:** area of 4 bytes entered in decimal notation with decimal point representing the Internet address or IP address of the PROFINET Controller channel 1 (CH1)<br>**Sub-Network Mask:** defines the addresses to be routed by the gateway and the network of valid IP addresses.<br>**Gateway IP Address:** IP address of a machine which can perform routing to another network. PROFINET is not an IP-based protocol. It will not be possible to route I/O exchanges through a gateway.<br>**Controller Name:** PROFINET name of the IO-Controller. | - | - |
| Description | Provides help on the selected field. | read-only | - |
| OK | Close dialog and save changes | - | Default button |
| Cancel | Close dialog and discard changes | - | - |
| Help | Open online help | - | - |

## IP Address Manager

The ‘IP Address Manager’ service manages the IP address allocation for IO-Devices present in the configuration.

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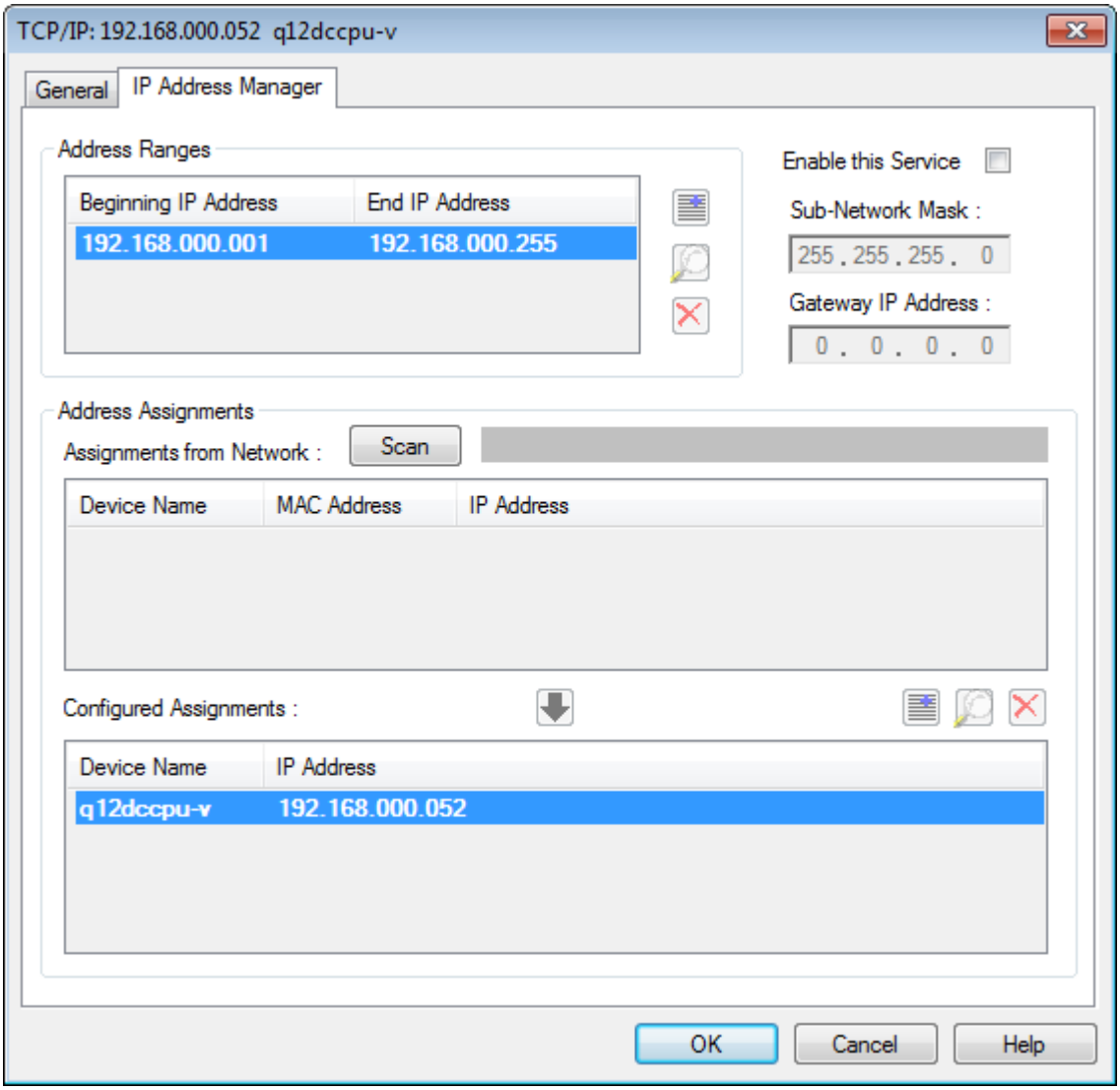


| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Address Ranges | define one or more IP address ranges<br>IP addresses from these ranges will be distributed by the console when an IO-Device is added.<br>The address ranges are managed using the following buttons:<br> Creates an address range<br> Edits the selected address range<br> Deletes the selected address range | - | - |
| Address Assignments | To reserve IP addresses for predefined IO-Device names | - | - |

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| Name | Description | Choices / Range | Default |
|---|---|---|---|
| | This is useful for IO-Devices with addresses which must remain fixed. When the respective IO-Device is inserted into the current configuration, the corresponding IP address will automatically be assigned to it. | | |
| Scan | Get a list of I/O devices on the network<br>The button is used to copy device name and IP address to the 'Configured Assignments' list. Alternatively the button allows to make an assignment by specifying the IP address and the name of the IO-Device. | - | - |
| Enable this Service | Enable the 'IP Address Manager' service | selected / not selected | not selected |
| Sub-Network Mask | Sub-netwok mask from the configuration of the PROFINET Controller<br>The subnetwork mask along with the gateway address cannot be configured using this service. | read-only | |
| Gateway IP Address | Gateway address from the configuration of the PROFINET Controller | read-only | |
| Configured Assignments | List of configured pairs of device name and IP address, which are assigned by the address manager, when the device is connected.<br> : Edits the selected entry<br> : Deletes the selected entry | - | - |
| OK | Close dialog and save changes | - | Default button |
| Cancel | Close dialog and discard changes | - | - |
| Help | Open online help | - | - |

When a connection is established, the PROFINET Controller can send the TCP/IP configuration to an IO-Device. This helps to avoid problems with IP address conflicts. The IP addresses distributed by the console will only be effective, when the PROFINET Controller establishes the connection with the IO-Device.

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# 7.4 Items View

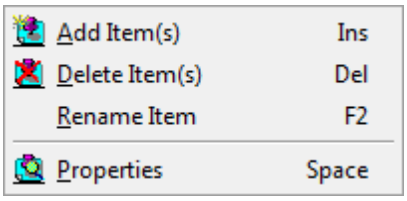
Lists the I/O points of the module selected in the network configuration view.

| Input Item Name | Data type | Offset/device | Offset/module | Bit in the byte | Offset in Word in D Area |
|---|---|---|---|---|---|
| SLOT003-STATUS-CHANNEL-0 | Input byte | 4 | 0 | | D4555 |
| SLOT003-CNT-VAL-CHANNEL-0 | Input word | 5 | 1 | | D4556 |
| SLOT003-STATUS-CHANNEL-1 | Input byte | 7 | 3 | | D4557 |
| SLOT003-CNT-VAL-CHANNEL-1 | Input word | 8 | 4 | | D4558 |

| Output Item Name | Data type | Offset/device | Offset/module | Bit in the byte | Offset in Word in D Area |
|---|---|---|---|---|---|
| SLOT003-CONTROL-CHANNEL-0 | Output byte | 8 | 0 | | D4547 |
| SLOT003-CNT-SET-CHANNEL-0 | Output word | 9 | 1 | | D4548 |
| SLOT003-CONTROL-CHANNEL-1 | Output byte | 11 | 3 | | D4549 |
| SLOT003-CNT-SET-CHANNEL-1 | Output word | 12 | 4 | | D4550 |

The context menu in the view corresponds to the 'Items Menu' in the main menu.

## 7.4.1 'Items' Menu




The menu contains the following commands:

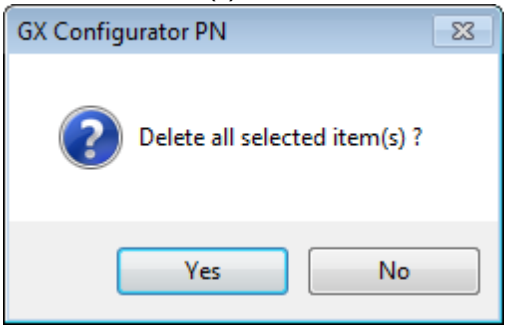
| Command | Description |
|---|---|
| Add Item(s) | Add item(s) |
| Delete Item(s) | Delete selected item(s) |
| Rename Item | Rename the selected item |
| Properties | Properties of the selected item |

### Command 'Add Item(s)'

Opens the 'Items Declaration' dialog to define new items or edit existing ones.

### Command 'Delete Item(s)'

The selected item(s) are deleted, when the following query is confirmed.

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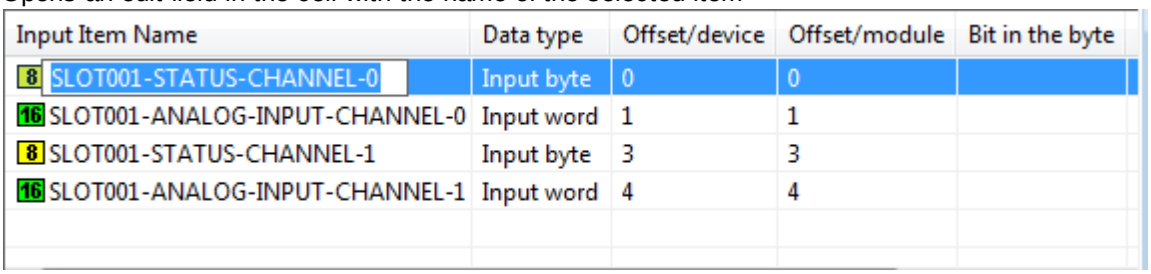
### Command 'Rename Item'

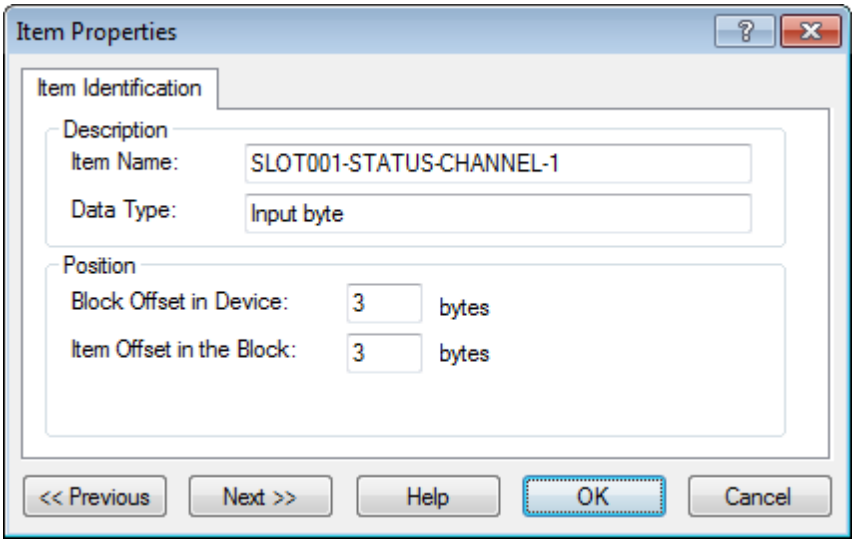
Opens an edit field in the cell with the name of the selected item




### Command 'Properties'

This command opens the 'Item Properties' dialog.

## 7.4.2 'Items Properties' Dialog




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Item Name | Item name | 1 - 50 characters | - |
| Data Type | Item data type | read-only | - |
| Block Offset in Device | Offset of the item within the input or output area of the device in bytes | read-only | - |
| Item Offset in the Block | Offset of the item within its block in bytes | read-only | - |
| Previous | Show settings of previous item in table | Enabled, the selected item is not the first one | - |
| Next | Show settings of next item in table | Enabled, the | - |

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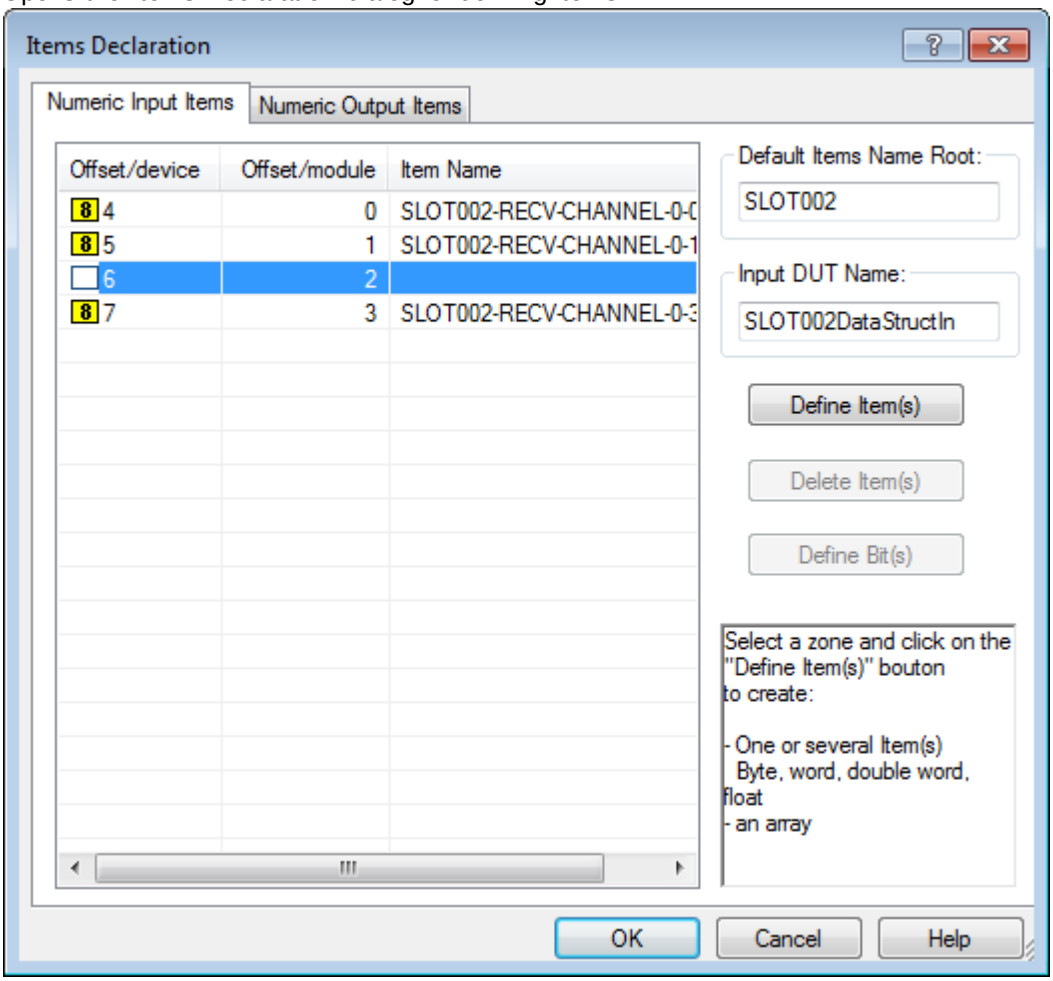
| Name | Description | Choices / Range | Default |
|---|---|---|---|
| | | selected item is not the last one | |
| Help | Open online help | - | - |
| OK | Close dialog and save changes | - | Default button |
| Cancel | Close dialog and discard changes | - | - |

### 7.4.3 'Items Declaration' Dialog

Opens the 'Items Declaration' dialog for defining items.




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Numeric Input Items | Table with items in input area | read-only | - |
| Numeric Output Items | Table with items in output area | read-only | - |

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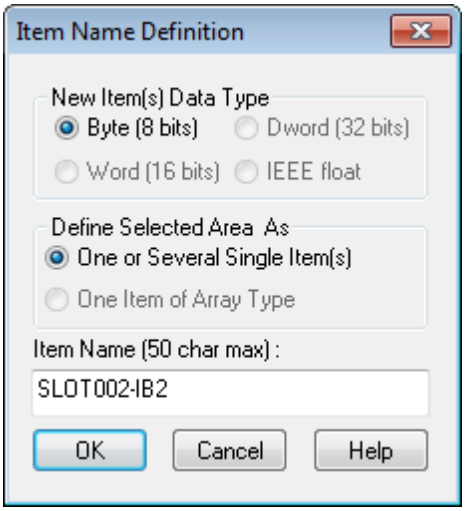
| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Default Items Name Root | Prefix for item names | | SLOT<nnn> with <nnn> being the slot in the slave |
| Input DUT Name | Name of the struct, which contains the items | | - |
| Define Item(s) | opens the 'Define Item(s)' dialog | Enabled, if an unallocated area is selected; disabled, if an existing item is selected | - |
| Delete Item(s) | delete selected item(s) | Enabled, if an existing item is selected | - |
| Define Bit(s) | opens the 'Define Bit(s)' dialog | Enabled, if an existing item is selected | - |
| OK | Close dialog and save changes | - | Default |
| Cancel | Close dialog and discard changes | - | - |
| Help | Open online help | - | - |

**Warning**: when changing the data type of an item the memory position may change. Elements of WORD, DWORD and REAL types are always placed on a word boundary. This may require insertion of padding bytes and thus change the sizes of the transfer buffers for the cyclic data. Therefore the refresh settings must always be updated in both the PLC CPU and the PROFINET Controller.

### Define Item(s)

Define one or more items.

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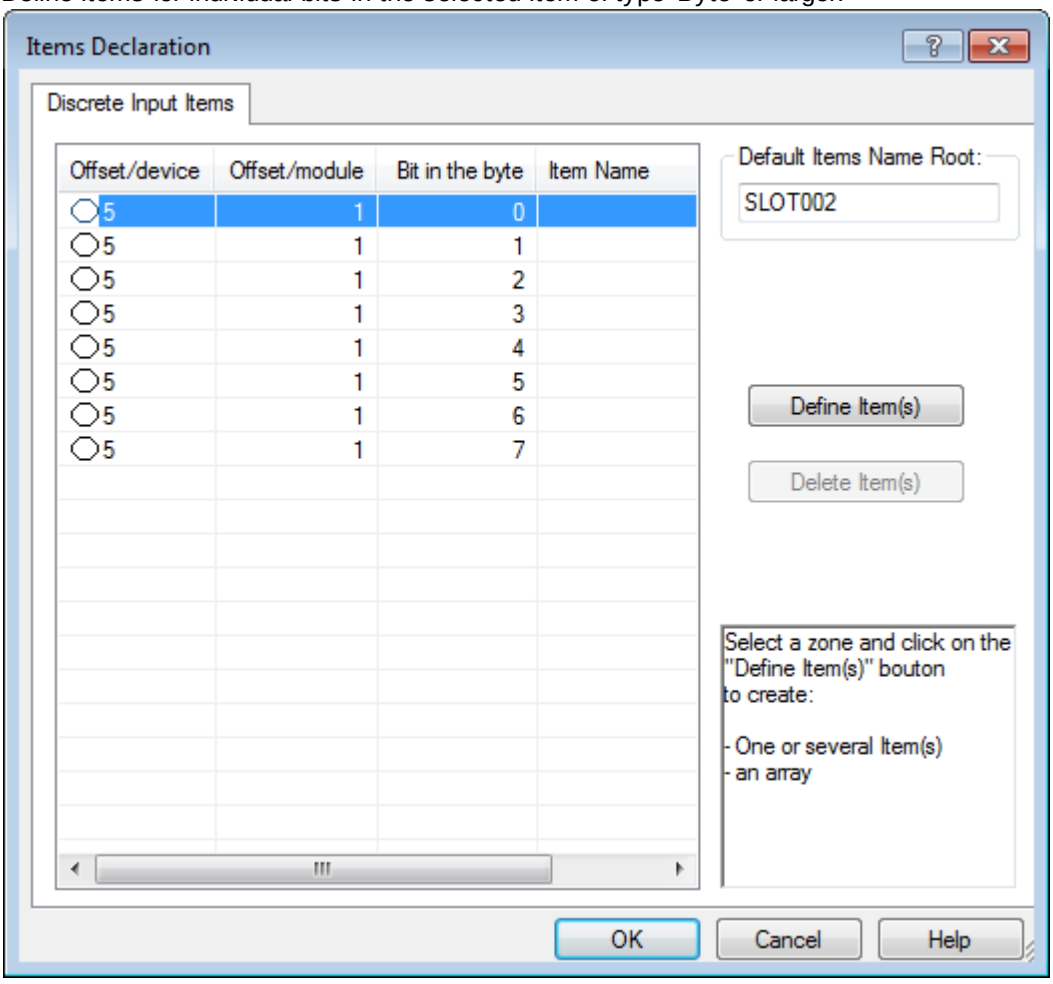
| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Data Type | Data type of the item | Byte, Word, Dword, IEEE float | Byte |
| Define Selected Area | Select, whether either several single items or an item of array type is created | Single Items / Array | Single Items |
| Item Name | Name of the new item | 1 - 50 characters | - |
| OK | Close dialog and save changes | - | Default button |
| Cancel | Close dialog and discard changes | - | - |
| Help | Open online help | - | - |

### Define Bit(s)

Define items for individual bits in the selected item of type 'Byte' or larger.

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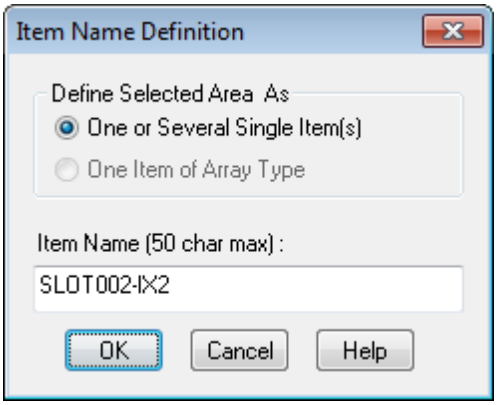
| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Discrete Input Items<br>or<br>Discrete Output Items | Table with items in input area | read-only | - |
| Default Items Name Root | Prefix for item names | - | SLOT<nnn> with <nnn> being the slot within the slave |
| Define Item(s) | opens the 'Item Name Definition' dialog<br>(see 'Bit Item Definition') | Enabled, if a very unallocated area is selected; disabled, if an existing item is selected | - |
| Delete Item(s) | delete selected item(s) | Enabled, if an existing item is selected | - |
| OK | Close dialog and save changes | - | Default button |
| Cancel | Close dialog and discard changes | - | - |
| Help | Open online help | - | - |

Bit Item Definition

Specify the name(s) for one or multiple bit items




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Define Selected Area | Select, whether either several single items or an item of array | Single Items / Array | Single Items |

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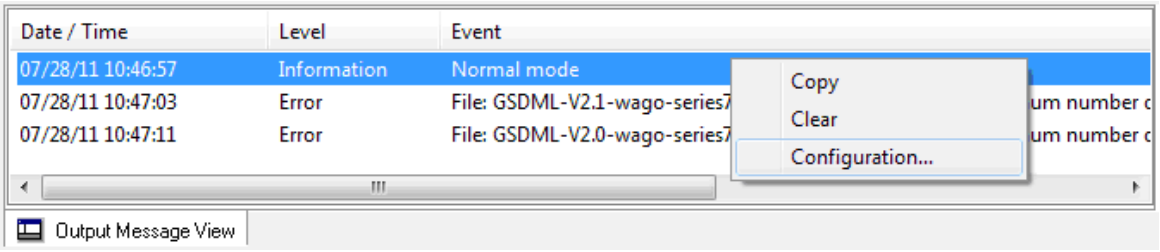
| Name | Description | Choices / Range | Default |
|---|---|---|---|
| | type is created | | |
| Item Name | Name of the new item | 1 - 50 characters | - |
| OK | Close dialog and save changes | - | Default button |
| Cancel | Close dialog and discard changes | - | - |
| Help | Open online help | - | - |

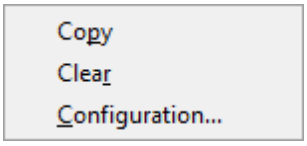
## 7.5 Message View

The message view shows the entries of the events log.




The message view contains a context menu.

### 7.5.1 'Message View' Menu




| Command | Description |
|---|---|
| Copy | Copies the contents of the message view to the clipboard |
| Clear | Deletes the contents of the message view |
| Configuration | Opens the 'Output Message View Configuration' dialog |

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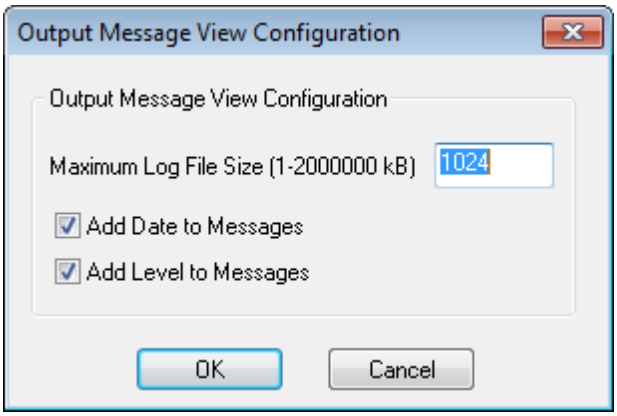
### 7.5.2 'Message View Configuration' Dialog

This dialog is used to configure the message view.




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Maximum Log File Size | Maximum size of log file | 1 - 2000000 kB | 1024 kB |
| Add Date to Messages | Add date field to entries | selected / not selected | selected |
| Add Level to Messages | Add level field to entries | selected / not selected | selected |
| OK | Close the dialog and save changes | - | Default |
| Cancel | Close the dialog and discard changes | - | - |

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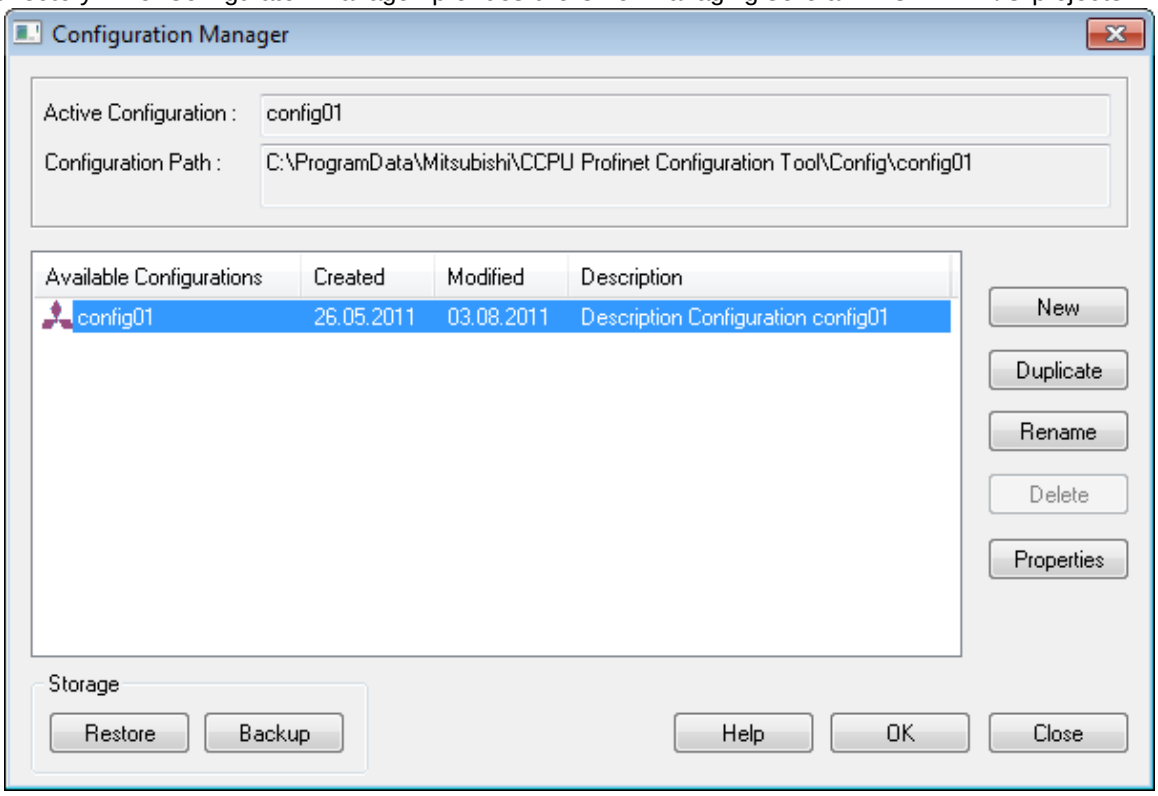
## 7.6 Configuration Manager

Each project with the settings for a PROFINET Controller is a ‘configuration’ and stored in a fixed directory. The ‘Configuraton Manager’ provides the UI for managing several PROFINET I/O projects.




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Active Configuration | Name of currently open controller project | read-only | - |
| Configuration Path | Directory of active configuration | read-only | - |
| Available Configurations | Names of existing configurations | read-only<br>(to change press 'Rename') | - |
| Created | Date, when configuration has been created | read-only | - |
| Modified | Date, when configuration has been modified for the last time | read-only | - |
| Description | Descriptive text of configuration | read-only<br>(to change press 'Properties') | - |
| New | Create a new configuration | - | - |

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| Name | Description | Choices / Range | Default |
|---|---|---|---|
| | Opens the 'New Configuration' dialog | | |
| Duplicate | Create a copy of the selected configuration<br>Opens the 'Duplicate Configuration' dialog | Enabled, if a configuration is selected; otherwise disabled | - |
| Rename | Opens the 'Rename Configuration' dialog for the selected configuration | Enabled, if a configuration is selected; otherwise disabled | - |
| Delete | Delete the selected configuration | Enabled, if a configuration is selected and it is not the only one; otherwise disabled | - |
| Properties | Opens the 'Configuration Properties' dialog for the selected configuration | Enabled, if a configuration is selected; otherwise disabled | - |
| Restore | Opens a file dialog for selecting a *.mit file created as backup before, which is added to the list of configurations | - | - |
| Backup | Opens a file dialog for selecting a *.mit file, the selected configuration is exported to | - | - |
| OK | Close dialog and save changes | - | - |
| Close | Close dialog and discard changes | - | - |
| Help | Open online help | - | - |

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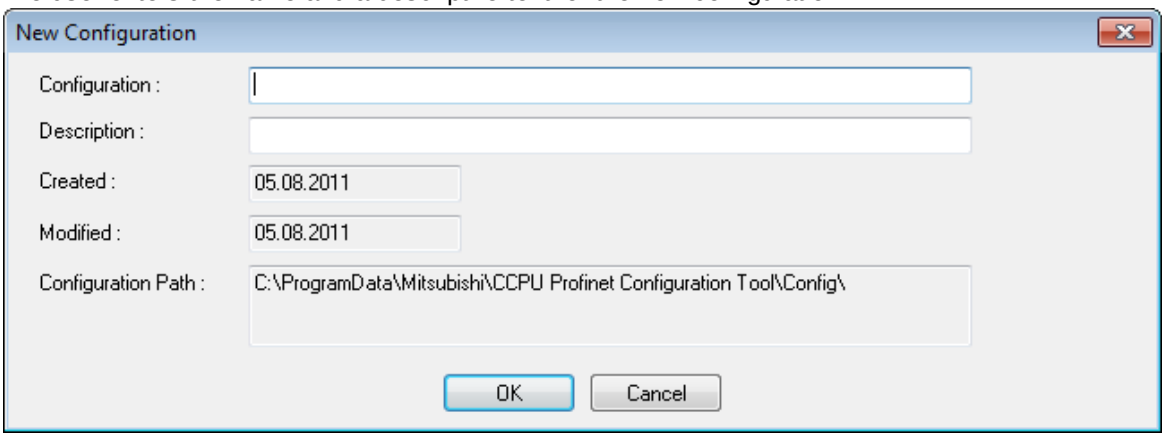
### 7.6.1 'New Configuration' Dialog

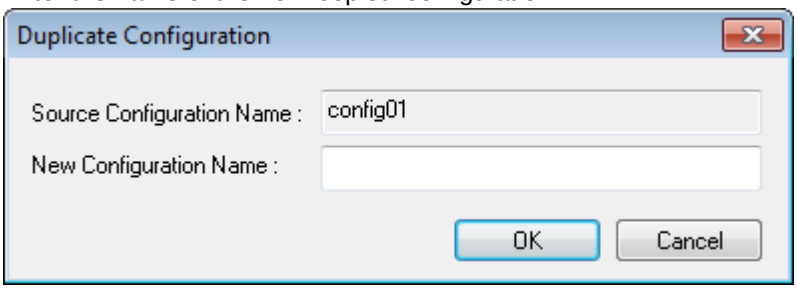
The user enters the name and a descriptive text for the new configuration.




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Configuration | Name of the selected configuration | 1-124 characters | - |
| Description | Descriptive text of configuration | - | - |
| Created | Date, when configuration has been created | read-only | - |
| Modified | Date, when configuration has been modified for the last time | read-only | - |
| Configuration Path | Directory of configuration | read-only | - |
| OK | Close dialog and save changes | - | Default |
| Cancel | Close dialog and discard changes | - | - |

### 7.6.2 'Duplicate Configuration' Dialog

Enter the name of the new 'copied' configuration.

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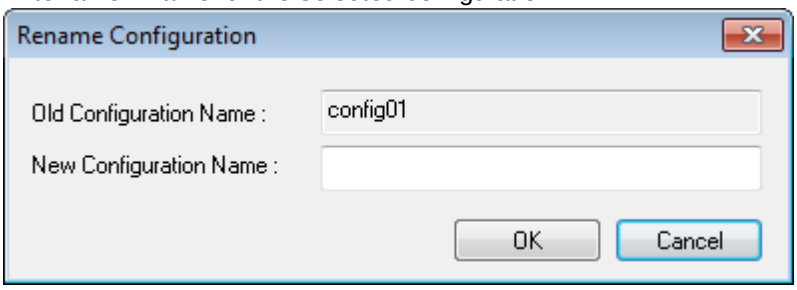
| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Source Configuration Name | Name of the selected original configuration | read-only | - |
| New Configuration Name | New name for the copy of the selected configuration | 1-124 characters | - |
| OK | Close dialog and save changes | - | Default |
| Cancel | Close dialog and discard changes | - | - |

### 7.6.3 'Rename Configuration' Dialog

Enter a new name for the selected configuration.




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Old Configuration Name | Current name of the selected configuration | read-only | - |
| New Configuration Name | New name for the selected configuration | 1-124 characters | - |
| OK | Close dialog and save changes | - | - |
| Cancel | Close dialog and discard changes | - | Default |

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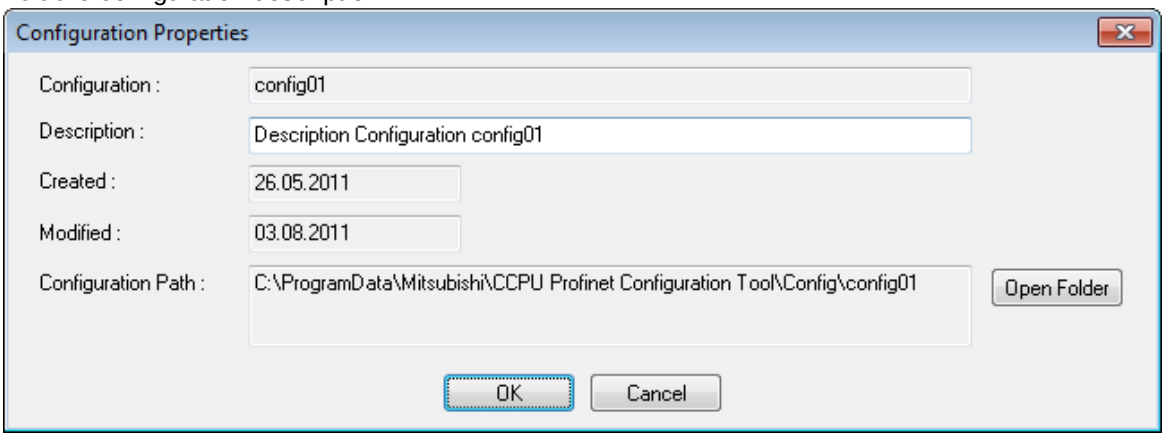
### 7.6.4 'Configuration Properties' Dialog

Edit the configuration description.




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Configuration | Name of the selected configuration | read-only | - |
| Description | Descriptive text of configuration | | - |
| Created | Date, when configuration has been created | read-only | - |
| Modified | Date, when configuration has been modified for the last time | read-only | - |
| Configuration Path | Directory of configuration | read-only | - |
| Open Folder | Opens the Windows file explorer and selects the configuration directory | - | - |
| OK | Close dialog and save changes | - | Default |
| Cancel | Close dialog and discard changes | - | - |

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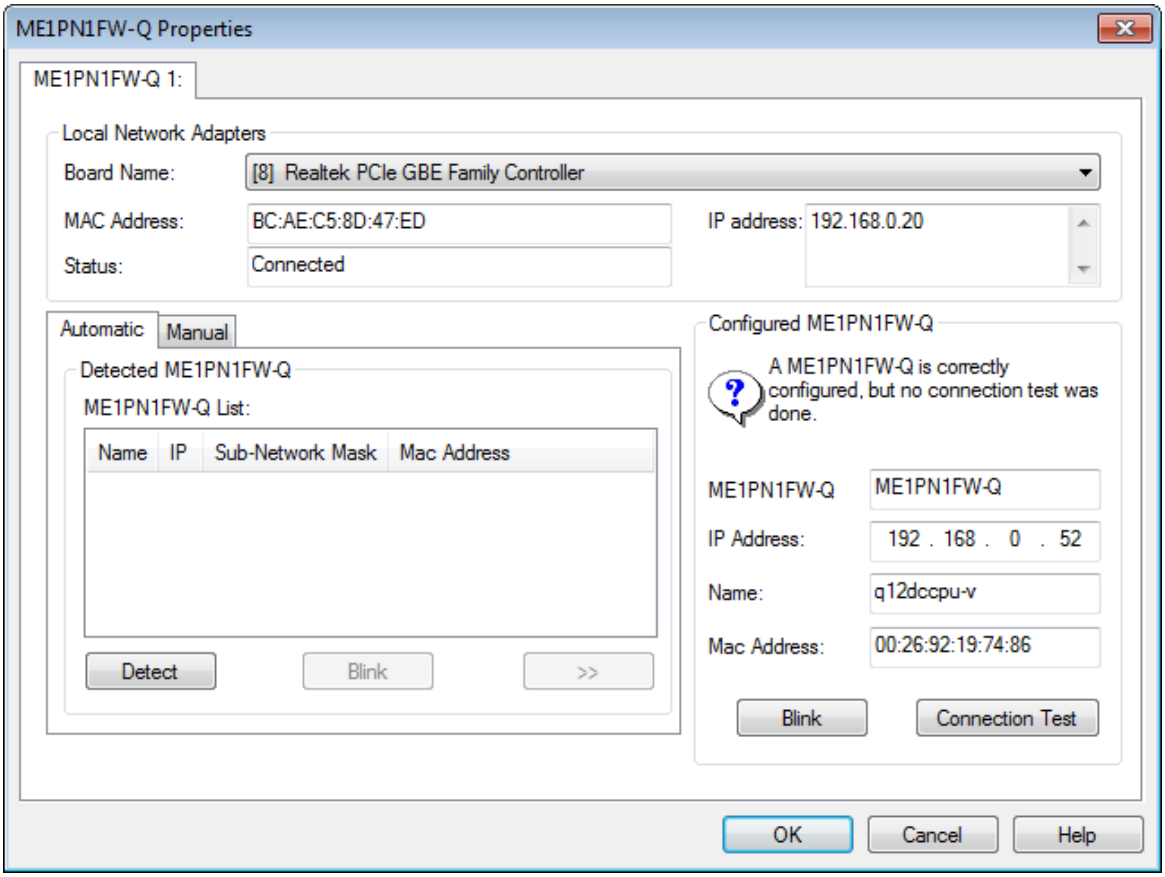
## 7.7 'ME1PN1FW-Q Properties' Dialog

Address settings of a ME1PN1FW-Q can be manually entered or copied from station found during a network scan.




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Board Name | List of local Ethernet interfaces to select the one, the PROFINET Controller is connected to | local Ethernet interfaces | - |
| MAC Address | MAC address of selected Ethernet interface | 6 pairs of hex digits separated by colons | - |
| Status | Connection status of selected Ethernet interface | read-only | - |
| IP address | IP address(es) assigned to selected Ethernet interface | read-only | - |
| Detect | Scan the network of the selected network adapter for suitable network stations. The controllers found are added to the list. | - | - |
| Blink | Flashes the LED display on the PROFINET Controller | Enabled, if a module entry in the table is selected | - |

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| Name | Description | Choices / Range | Default |
|---|---|---|---|
| >> | Copies the address of the selected PROFINET Controller to the ‘Configured...' section | Enabled, if a module entry in the table is selected | - |
| ME1PN1FW-Q | Controller model name | read-only | ME1PN1FW-Q |
| IP Address | Controller IP address | 4 integers in the range of 0-254 | 0.0.0.0 |
| Name | Controller name | | |
| MAC Address | MAC address of selected controller | 6 pairs of hex digits separated by colons | - |
| Blink | Flashes the LED display on the PROFINET Controller | - | - |
| Connection Test | Tries to connect to the PROFINET Controller | - | - |
| OK | Close dialog and save changes | - | Default button |
| Cancel | Close dialog and discard changes | - | - |
| Help | Open online help | - | - |

## 7.8 'IO-Device Configuration' Dialog

This dialog is displayed, when a new device is added to the network view, and when the item ‘Properties’ is selected from the context menu of the device in the network view. The settings of a PROFINET I/O slave device are accessed via the following tab pages in this dialog

- 'Device - General Configuration' Tab
- 'Device - Module Configuration' Tab
- 'Device - Parameters' Tab
- 'Device - Connection Information' Tab
- 'Device - I/O Data' Tab
- 'Device - GSDML File' Tab

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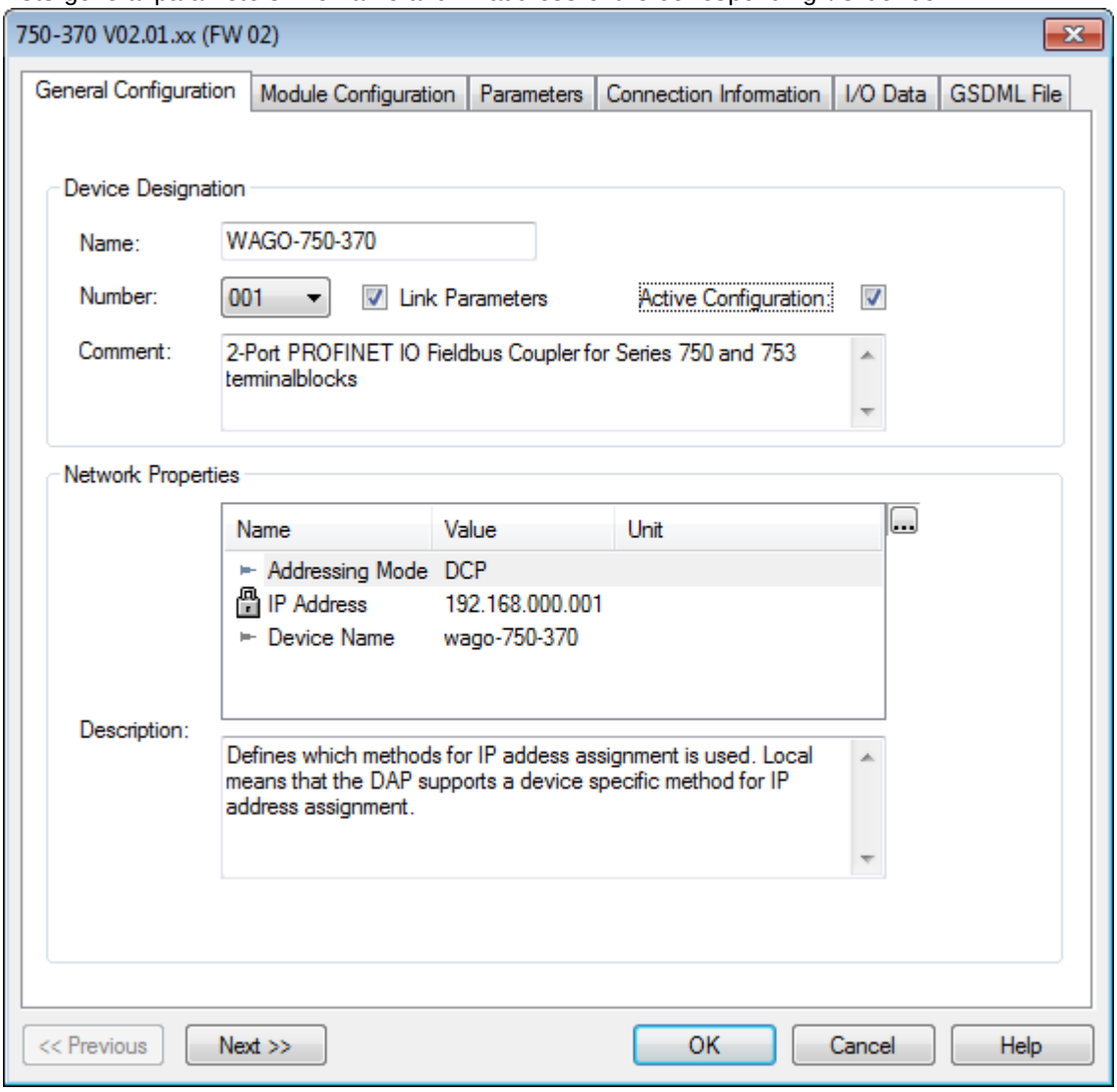
### 7.8.1 'Device - General Configuration' Tab

Lists general parameters like name and IP address of the corresponding I/O device.




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Name | Name of the IO-device | | Model name |
| Number | Device ID to be chosen from the list of devices not configured. | 0 - 127 | |
| Link Parameters | Checkbox to activate the link of the device number with the device IP address: the device number will then correspond to the station number of the IP address. | | |
| Active Configuration | Checkbox to activate the configuration of the device in the IO-Controller: used to delete a device from IO-Controller, whilst keeping its configuration in the console. | | |

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| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Comments | Free text related to a device. The total number of characters must not exceed 80. | 0 - 80 characters | |
| Addressing Mode | Defines the way of obtaining the IP configuration which may be DCP, Local or DHCP. The modes vary according to the contents of the GSD for the IO-Device.<br>**DCP**: during the connection, the IO-Controller sets the IP address of the IO-Device.<br>**DHCP**: during the connection, the IO-Controller compares the IP address of the IO-Device with that configured. If they are identical, the connection can go ahead. If not, the connection fails.<br>**Local**: during the connection, the IO-Controller uses the configured IP address. | | |
| IP Address | This IP address will be the IP address of the IO-Device after connection if the selected addressing is DCP.<br>This IP address shall be the same as the IP address configured inside the IO-Device if the selected addressing mode is different than DCP. | | |
| Device Name | This field shall be the same as name configured inside the IO-Device. (See Name an IO-Device) | | |
| Description | Provides help on the selected field. | read-only | - |
| Previous | Get settings of previous I/O device (slave) | disabled for first device | - |
| Next | Get settings of next I/O device (slave) | disabled for last device | - |
| OK | Close dialog and save changes | - | Default button |
| Cancel | Close dialog and discard changes | - | - |
| Help | Open online help | - | - |

**Note**: when creating a configuration from the 'Network Detection View' (aka 'automatic configuration mode'), IP address and name of the device are already set. When manually adding the device, these items must be entered by the user.

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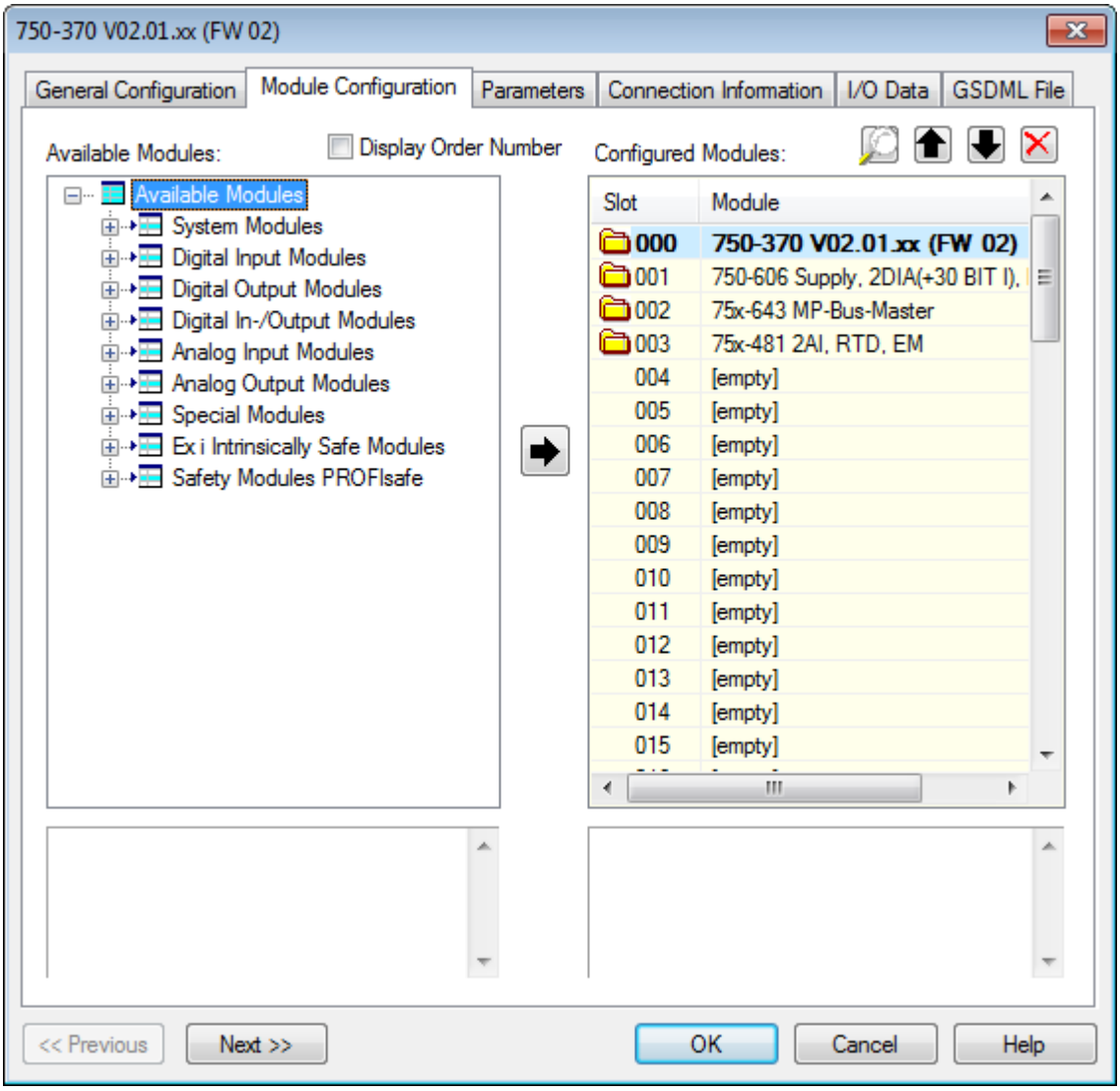
### 7.8.2 'Device - Module Configuration' Tab

This tab is used to select the modules in the IO-Device.




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Available Modules | Contains the list of modules compatible with the IO-Device configured. This list was established from the device library. From this list, it is possible to add the modules present on the IO-Device to the list of configured modules.<br><br>When a module can be configured, double-clicking the slot opens an editor for the module settings. The settings displayed are taken from the GSD file. Therefore the settings differ from between modules. | - | - |

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| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Display Order Number | If selected, only the order number from the GSDML file is displayed, otherwise the module type name | selected / not selected | not selected |
| Configured Modules | Modules in the I/O device per slot with their type names<br> : Opens the 'Module Configuration' dialog.<br> : Moves the selected module up in the list<br> : Moves the selected module down in the list<br> : Deletes the selected module; same as pressing the [Del] key. | - | - |
| | Adds a module from the list of modules available to the list of those configured.<br>Other ways of carrying out this command:<br>• Double click the module to be added<br>Drag and drop the module to be added | - | - |
| Previous | Get settings of previous I/O device (slave) | disabled for first device | - |
| Next | Get settings of next I/O device (slave) | disabled for last device | - |
| OK | Close dialog and save changes | - | Default button |
| Cancel | Close dialog and discard changes | - | - |
| Help | Open online help | - | - |

**Note**: when creating a configuration from the 'Network Detection View' (aka 'automatic configuration mode'), the module list is already filled. When manually adding the device, the modules must be added by the user.

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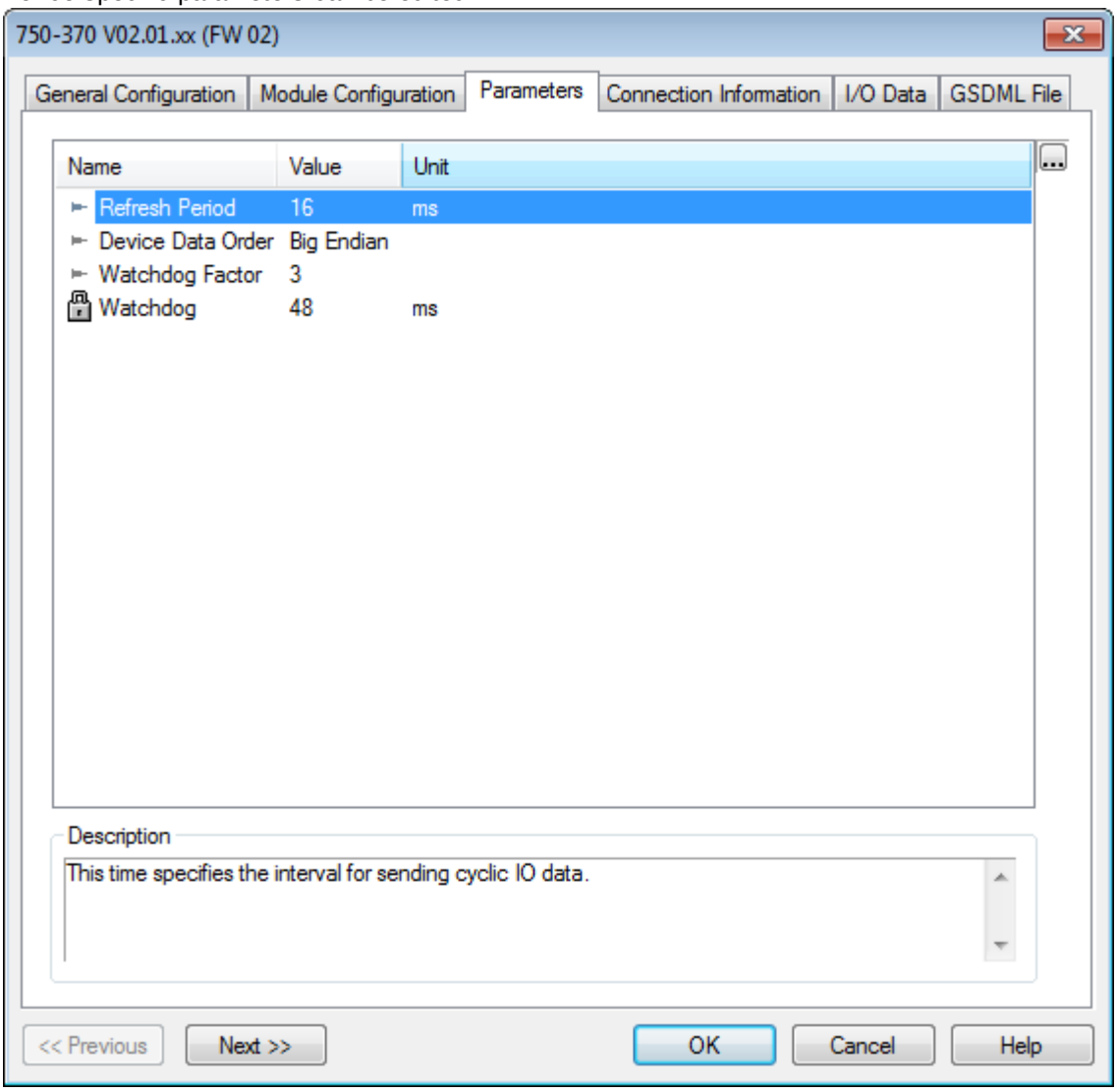
### 7.8.3 'Device - Parameters' Tab

Device specific parameters can be edited.




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Refresh Period | Time interval in milliseconds between the transmission of each production frame and the reception of each consumption frame. | - | 16 ms |
| Device Data Order | Data order for the device<br>Used to specify the data format in memory of the 16 and 32-bit words:<br>"Little Endian (Intel)" format: In increasing address order: low order byte – high order byte.<br>"Big Endian (Motorola)" format: In increasing address order: high order byte - low order byte | 'Little Endian' / 'Big Endian' | 'Big Endian' |

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| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Watchdog Factor | This value is used to calculate the production and consumption time out period.<br>Time out period = Refresh period * Watchdog factor<br>The result is displayed in the Watchdog field. | - | 3 |
| Watchdog | Production and consumption timeout period | read-only | - |
| Description | Provides help on the selected field. | read-only | - |
| Previous | Get settings of previous I/O device (slave) | disabled for first device | - |
| Next | Get settings of next I/O device (slave) | disabled for last device | - |
| OK | Close dialog and save changes | - | Default button |
| Cancel | Close dialog and discard changes | - | - |
| Help | Open online help | - | - |

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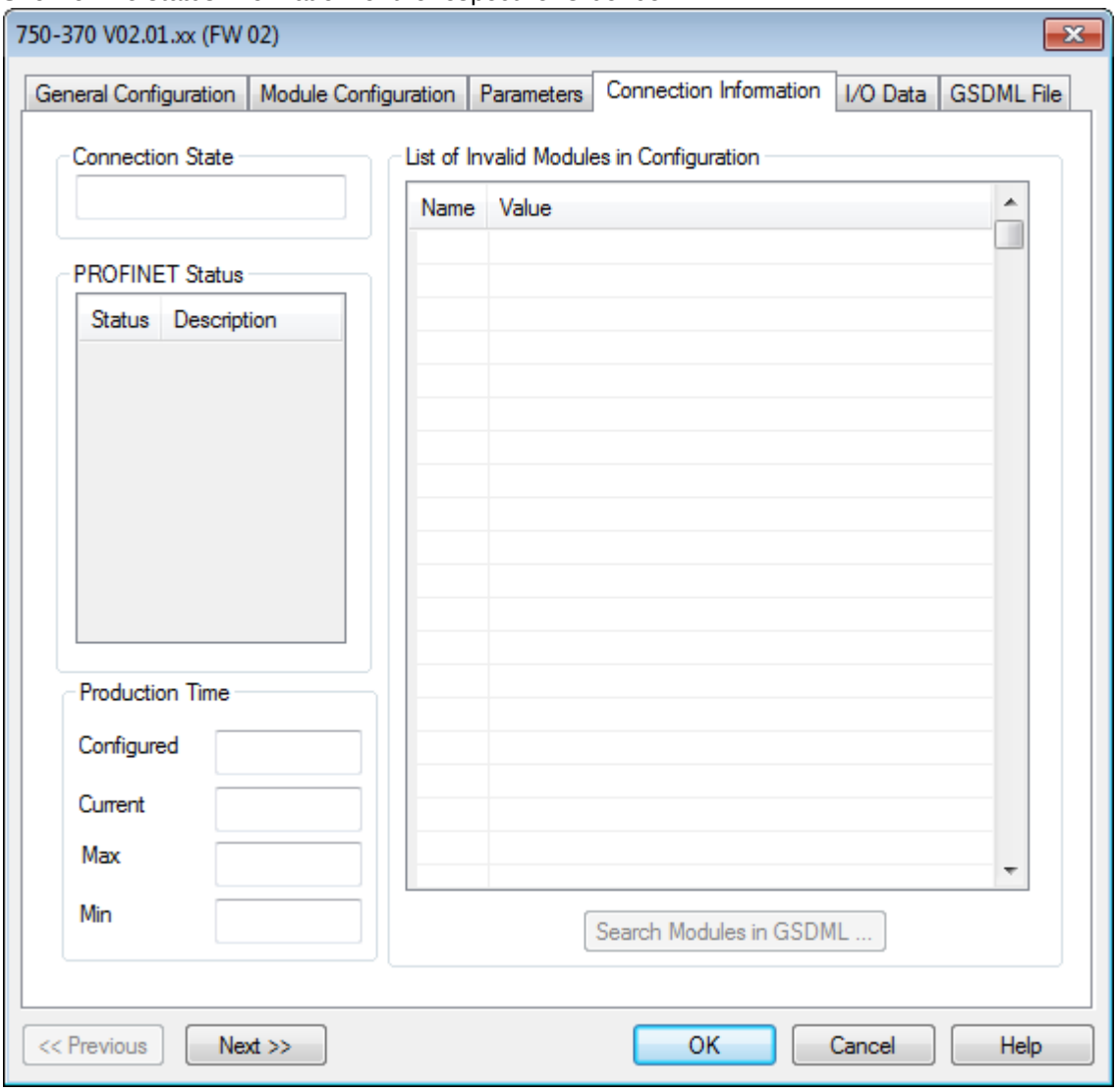
### 7.8.4 'Device - Connection Information' Tab

Show online status information for the respective IO-device.




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Connection State | Indicates, whether the IO-Controller is **connected to** or **disconnected from** the IO-Device. | - | - |
| PROFINET Status | The values of the stati displayed are those defined by the PROFINET standard. | - | - |
| List of Invalid Modules in Configuration | The IO-Controller may connect to an IO-Device with an imprecise module configuration. In this case, the IO-Device may accept the connection while indicating the differences between the configured modules and the modules making up the IO-Device.<br>**Configured identification Number**: corresponds to the module configured in the | - | - |

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| Name | Description | Choices / Range | Default |
|---|---|---|---|
| | engineering tool<br>**Actual identification Number**: the value for the module present in the IO-Device<br>**Module status**: current status of the module in the IO-Device | | |
| Production Time | Shows the configured and the current cycle time for the device as well as the maximum and minimum cycle time since starting the cyclic data exchange | - | - |
| Search Modules in GSDML | Lookup module information in the GSDML files | - | - |
| Previous | Get settings of previous I/O device (slave) | disabled for first device | - |
| Next | Get settings of next I/O device (slave) | disabled for last device | - |
| OK | Close dialog and save changes | - | Default button |
| Cancel | Close dialog and discard changes | - | - |
| Help | Open online help | - | - |

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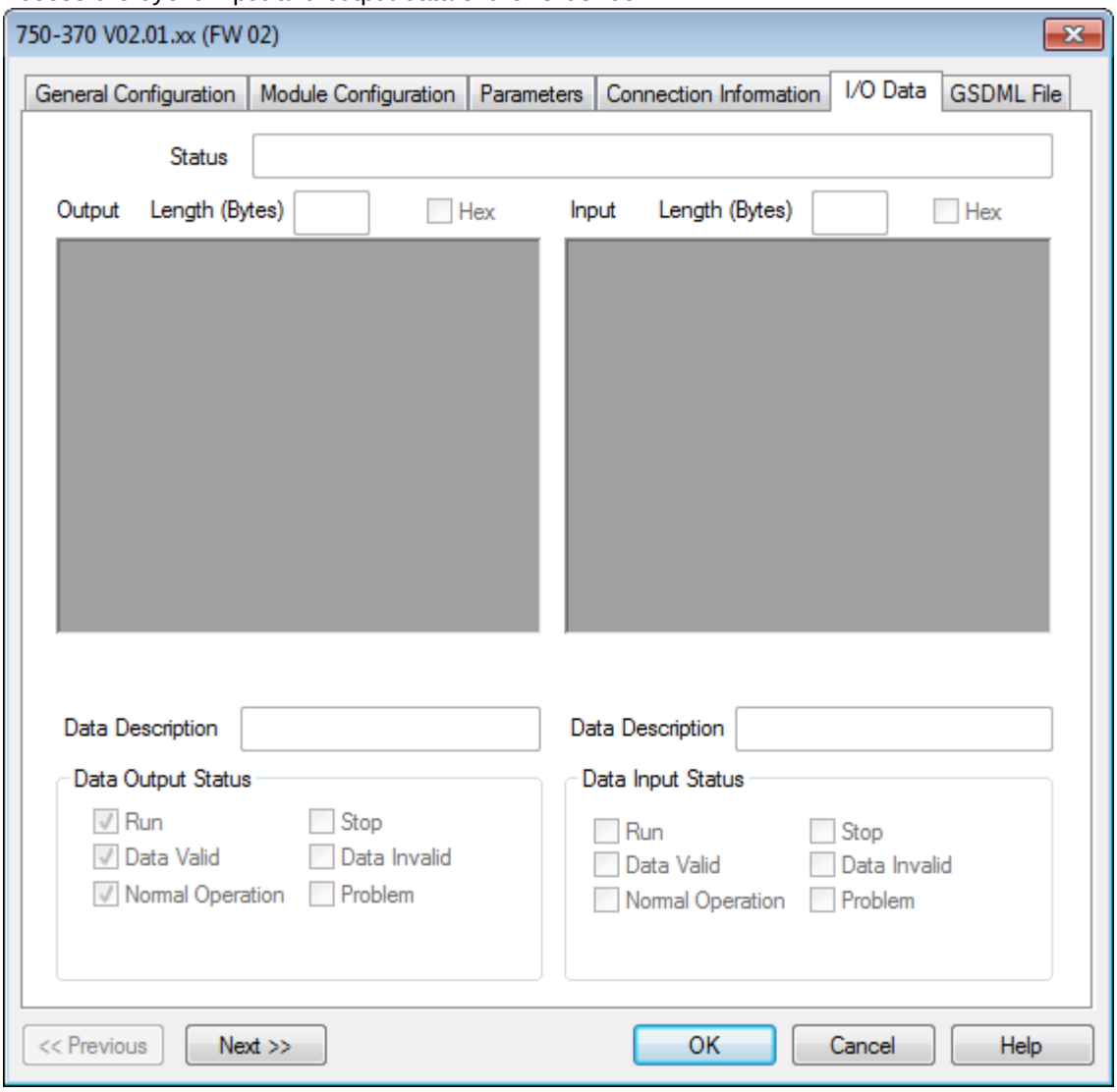
### 7.8.5 'Device - I/O Data' Tab

Access the cyclic input and output data of the IO-device.




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Status | Indicates whether the connection has been established (OK) or not. A detailed status is given in the information on the connection tab. | | |
| Output | Displays the output values for the IO-Device. The output values may be changed by clicking them. | | |
| Input | Displays the input values for the IO-Device.<br>The input and output views include either:<br>Data : the background of the cell is yellow<br>IOPS (IO provider status) and IOCS (IO | read-only | |

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| Name | Description | Choices / Range | Default |
|---|---|---|---|
| | consumer status): the background of the cell is green if the value is GOOD, if not the background of the cell is red | | |
| Set Values | Writes the modified output values to the device | | |
| Dismiss modifications | Returns to the initial values | | |
| Data Description | The field gives the slot number, sub-slot number and the type of data item selected simply by clicking a value. A data item may be:<br>IOCS: Represents a consumption status<br>IOPS: Represents a production status<br>Data: Represents data. | | |
| Data Output Status | Shows the status of the outputs production frame called the production APDU Status.. | | |
| Data Input Status | Shows the status of the inputs production frame called the production APDU Status. | | |
| Run / Stop | Where the IO-Controller is in stop mode, the IO-Devices must not consume the data received and vice-versa. | For inputs read-only | - |
| Data Valid / Data Invalid | If the IO-Controller is in Invalid data mode, the IO-Device must close the connection. | | - |
| Normal Operation / Problem | If the IO-Controller is in Problem mode, the IO-Device must close the connection. | | - |
| Previous | Get settings of previous I/O device (slave) | disabled for first device | - |
| Next | Get settings of next I/O device (slave) | disabled for last device | - |
| OK | Close dialog and save changes | - | Default button |
| Cancel | Close dialog and discard changes | - | - |
| Help | Open online help | - | - |

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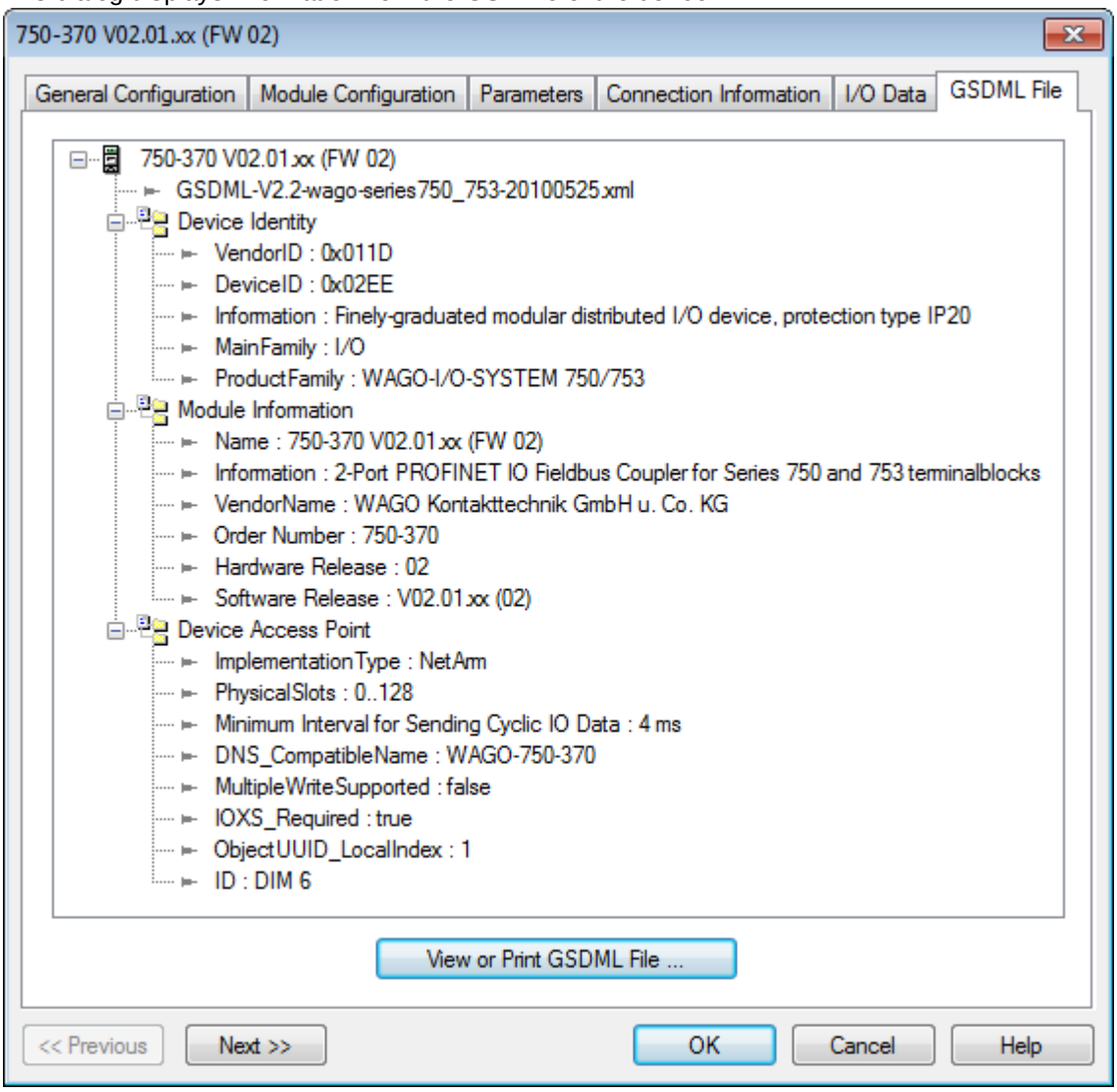
### 7.8.6 'Device - GSDML File' Tab

This dialog displays information from the GSD file of the device.




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Tree | Lists the entries of the GSDML file | - | - |
| View or Print GSDML File… | Displays the file in a Windows text editor. This text editor can be used to print the file. What is displayed is a copy of the GSD with the .txt extension. | - | - |
| Previous | Get settings of previous I/O device (slave) | disabled for first device | - |
| Next | Get settings of next I/O device (slave) | disabled for last device | - |
| OK | Close dialog and save changes | - | Default |

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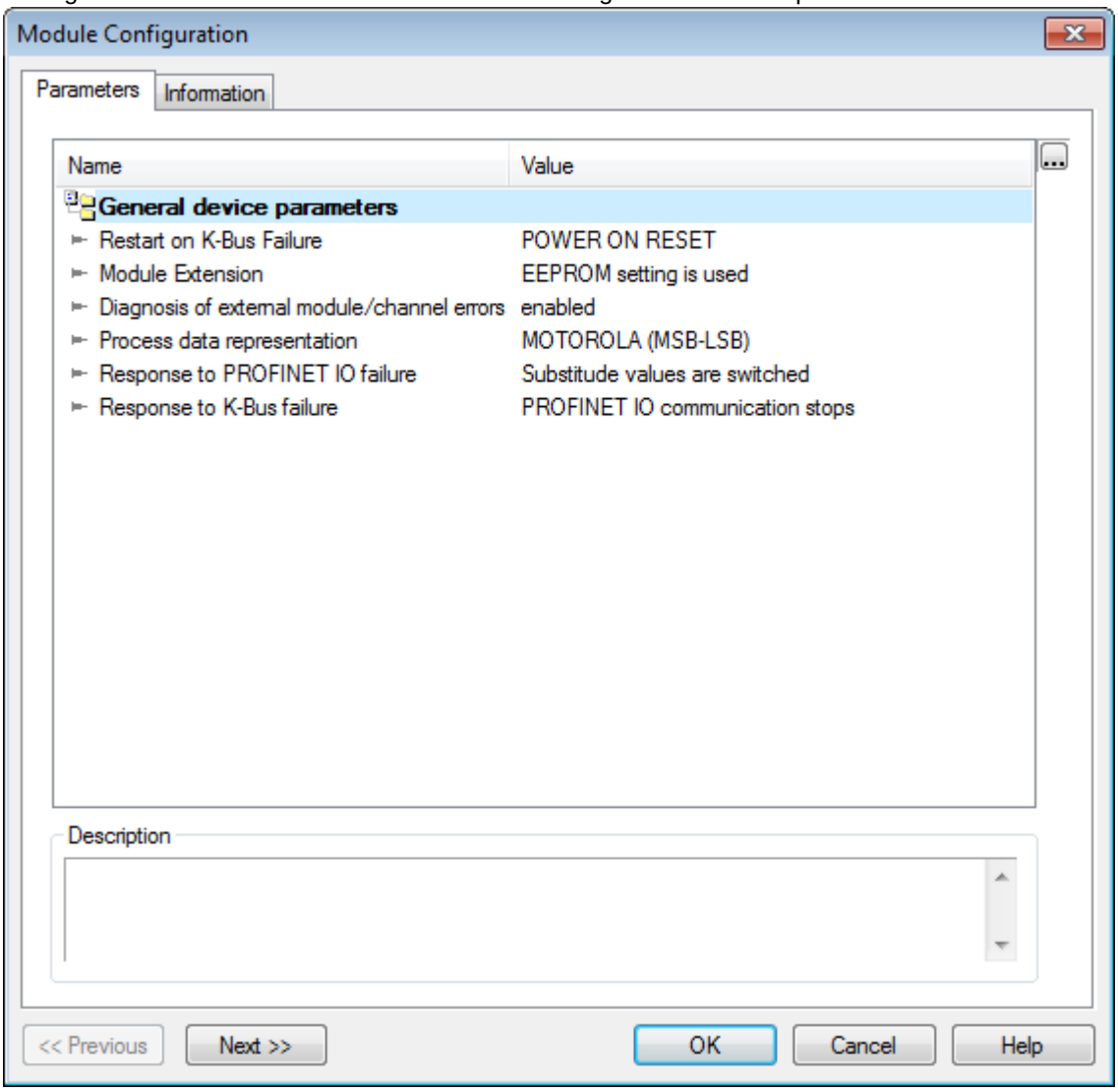
| Name | Description | Choices / Range | Default |
|---|---|---|---|
| | | | button |
| Cancel | Close dialog and discard changes | - | - |
| Help | Open online help | - | - |

## 7.9 'Module Configuration' Dialog

The 'Module Configuration' dialog provides access to module-specific parameters.
It contains the 'Module Parameters' tab and the 'Module Information' tab.

### 7.9.1 'Module Parameters' Tab

Lists the parameters of the selected module as defined in the GSD file of the device type. The settings in this tab will be sent to the IO-Device during the connection phase.



| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Name | Parameter name | read-only | - |
| Value | Parameter value | device specific | device specific |
| Description | Descriptive text for parameter | read-only | - |
| Previous | Go to the previous module of the device | disabled for the first module | - |
| Next | Go to the next module of the device | disabled for the last module | - |
| OK | Close dialog and save changes | - | Default button |
| Cancel | Close dialog and discard changes | - | - |
| Help | Open online help | - | - |

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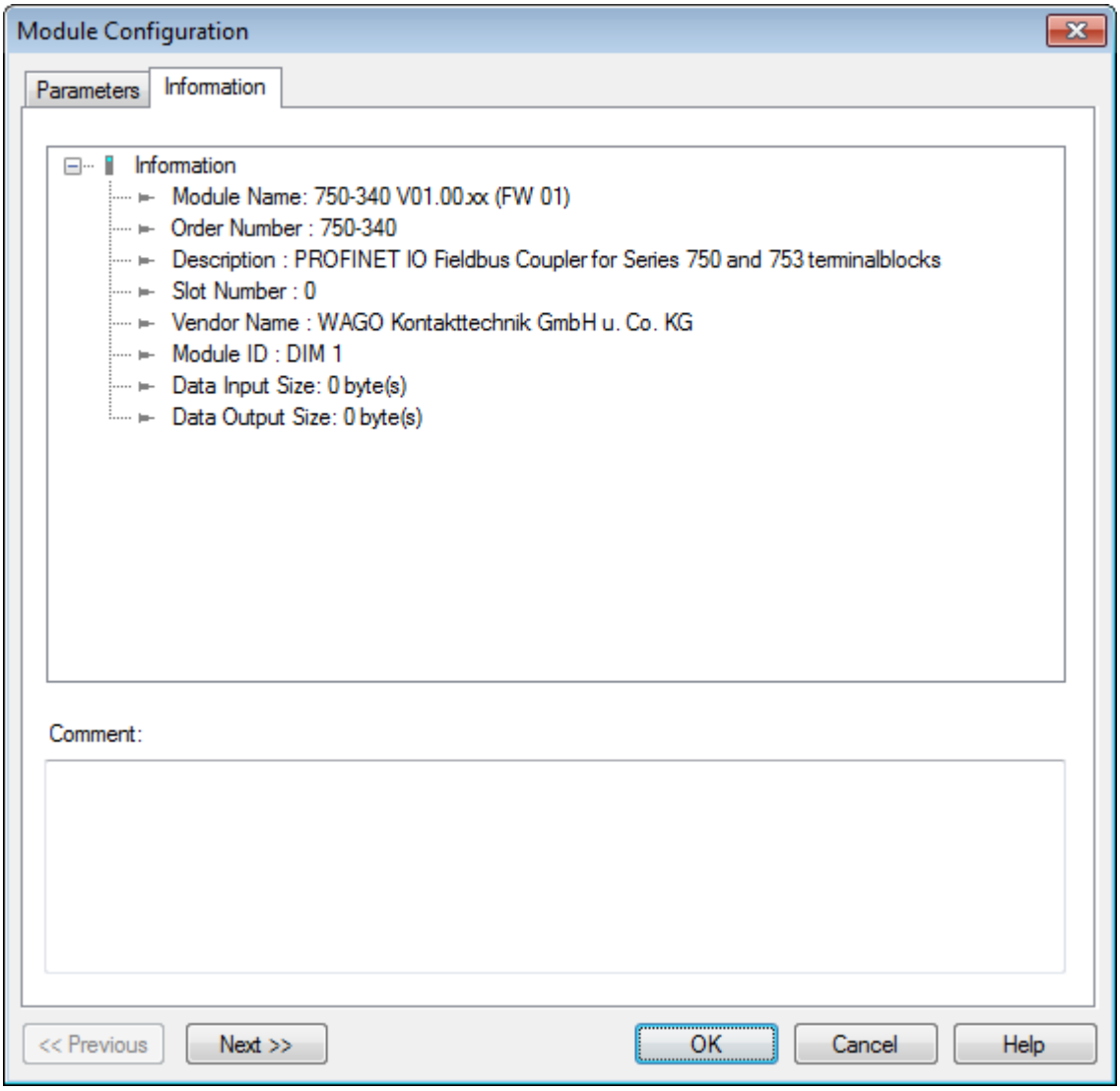
### 7.9.2 'Module Information' Tab

Show information on the selected module taken from the GSD file of the IO-device.




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Information | Lists properties of the module | read-only | - |
| Comment | User comment for the module | | - |
| Previous | Go to the previous module of the device | disabled for the first module | - |
| Next | Go to the next module of the device | disabled for the last module | - |
| OK | Close dialog and save changes | - | Default button |

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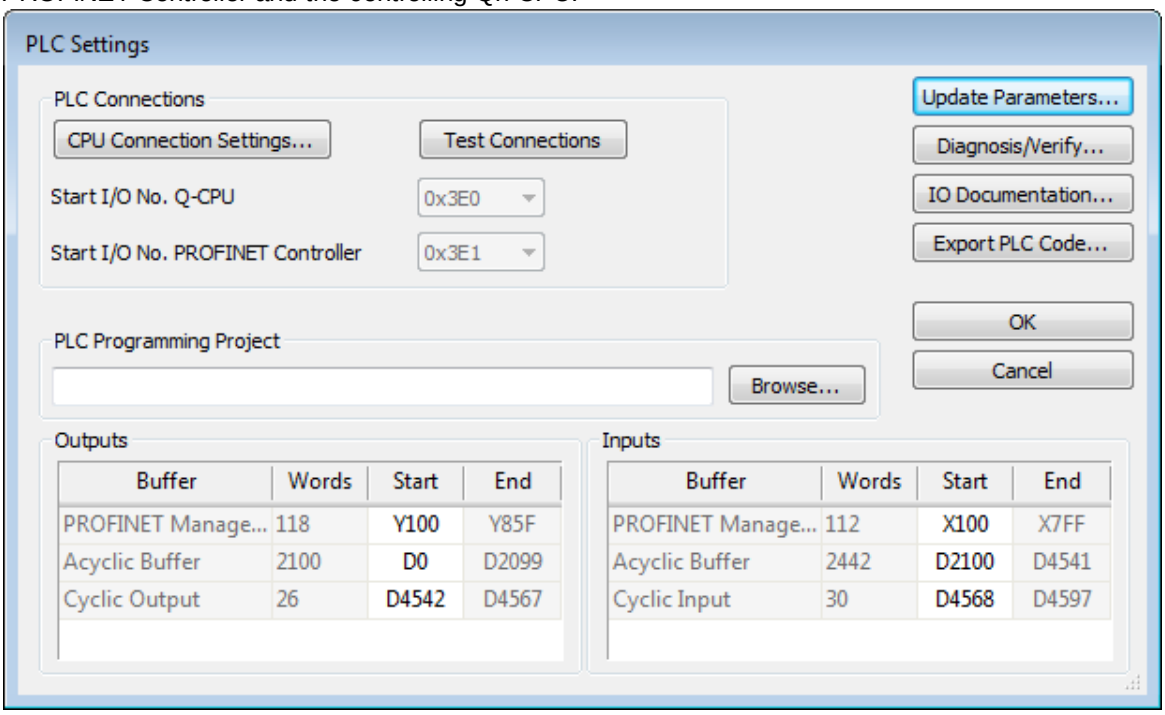
| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Cancel | Close dialog and discard changes | - | - |
| Help | Open online help | - | - |

**Note:** the values contained in this tab come from analyzing the GSD for the IO-Device. Depending on the version of the GSD and IO-Device, the values will differ. They are displayed for information only.

## 7.10 'PLC Settings' Dialog

The 'PLC Settings' dialog provides the user interface for configuring the data exchange between the PROFINET Controller and the controlling Qn-CPU.




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| CPU Connection Settings | Opens the transfer setup editor for the configuration of the connection to the Q-series PLC | - | - |
| Test Connections | Tries to connect to the Q-series CPU and to the Profinet Controller (via FTP) and shows the results | - | - |
| Start I/O No. Q-CPU | Starting I/O number of the Q-CPU, which controls the PN controller (corresponds to sequential index of Q-CPU) | fixed 0x3E0 | 0x3E0 |

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| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Start I/O No. PROFINET Controller | Starting I/O number of the PROFINET Controller (corresponds to sequential index of CCPU) | fixed 0x3E1 | 0x3E1 |
| PLC Programming Project | Contains the path of the corresponding PLC project file for either GD (gppw.gpj) or GID (softctrl.pro) | - | empty |
| Browse | Opens a file dialog for selecting the GD or GID project | - | - |
| Outputs | Lists the output buffers (QCPU -> PROFINET Controller); only the device addresses in the 'Start' column are editable, other columns are readonly | for input in the 'Start' column see 'Supported PLC Device Types' below | - |
| Inputs | Lists the input buffers (QCPU <- PROFINET Controller); only the device addresses in the 'Start' column are editable, other columns are readonly | | - |
| Update Parameters | Opens the 'Update Parameters' Dialog and executes the listed updates | - | - |
| Diagnosis/Verify | Opens the 'Multiple CPU Refresh Settings' dialog | - | - |
| IO Documentation | Generates an HTML document with global variables and buffer devices | - | - |
| Export PLC Code | Opens a file dialog, where the user enters the name of the .asc-file, in which the program definitions and references to user libraries are stored. For details see section 'PLC Code for PROFINET Controller'. | - | - |
| OK | Close dialog and save changes | - | Default button |
| Cancel | Close dialog and discard changes | - | - |

### Supported PLC Device Types

The following table lists the supported device types and their respective address ranges.

| Device Type | Address Range |
|---|---|
| X | 0x0 – 0x1FFF |
| Y | 0x0 – 0x1FFF |
| L | 0 – 32767 |

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| Device Type | Address Range |
|---|---|
| M | 0 – 32767 |
| D | 0 – 25983 |
| R | 0 – 32767 |
| B | 0x0 – 0x7FFF |
| W | 0x0 – 0x657F |
| ZR | 0 – 4184063 |

### Default Device Addresses

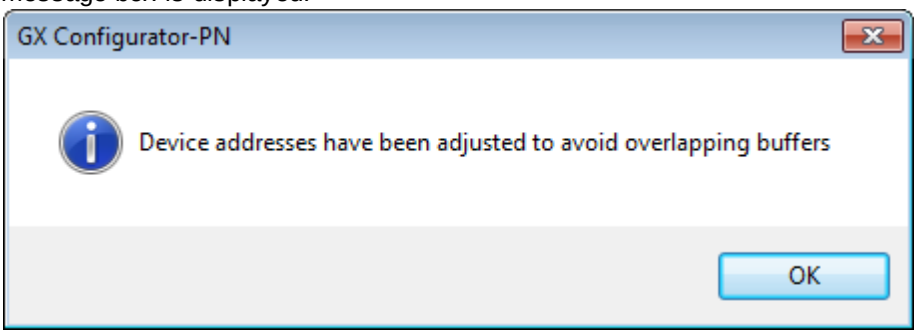
For a new project GX Configurator-PN assigns default device addresses to the refresh buffers according to the following schema

| Buffer | Default Device Address |
|---|---|
| PROFINET Management (Outputs) | Y0 |
| PROFINET Management (Inputs) | X0 |
| Acyclic Buffer (Outputs) | D0 |
| Acyclic Buffer (Inputs) | D2100 |
| Cyclic Output | D4542 |
| Cyclic Input | D4542 + <cyclic output size> |

The default device address of the cyclic input area is the first D-device behind the area occupied by the cyclic outputs. It depends therefore on the cyclic output size of the network configuration.
Note: the default device address is only assigned in a new project and is not adjusted, when the cylic output size changes due to changes in the network configuration.

### Check of Overlapping Device Areas

The device addresses of the six input and output buffers are checked for overlapping devices each time the dialog is opened. The conflicting device addresses are automatically adjusted. The following message box is displayed:




They are also checked for overlapping devices each time the dialog is closed by pressing ‘OK’ or when calling the ‘IO Documentation’ or ‘Export PLC Code’ functions. If device areas overlap, a warning is displayed.

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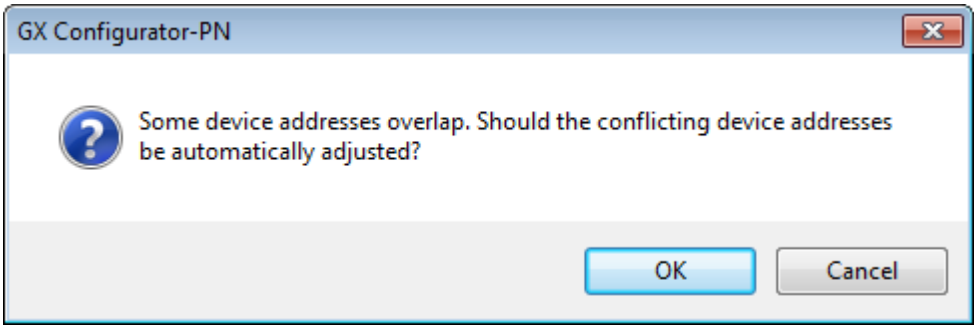
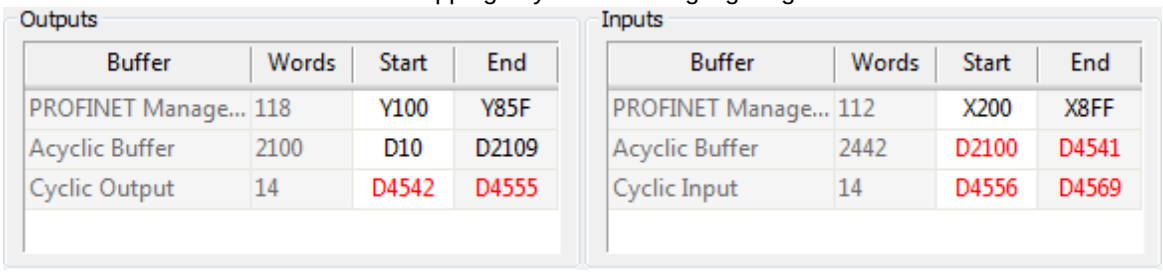

GX Configurator-PN
Some device addresses overlap. Should the conflicting device addresses be automatically adjusted?
OK
Cancel

If the user presses 'OK' the conflicting device addresses are adjusted automatically. If the user presses 'Cancel' the dialog remains open in order to correct the device addresses manually. The conflicting device addresses are highlighted with red color to easily allow identification. If the corrected device address is not overlapping any more the highlighting is canceled.

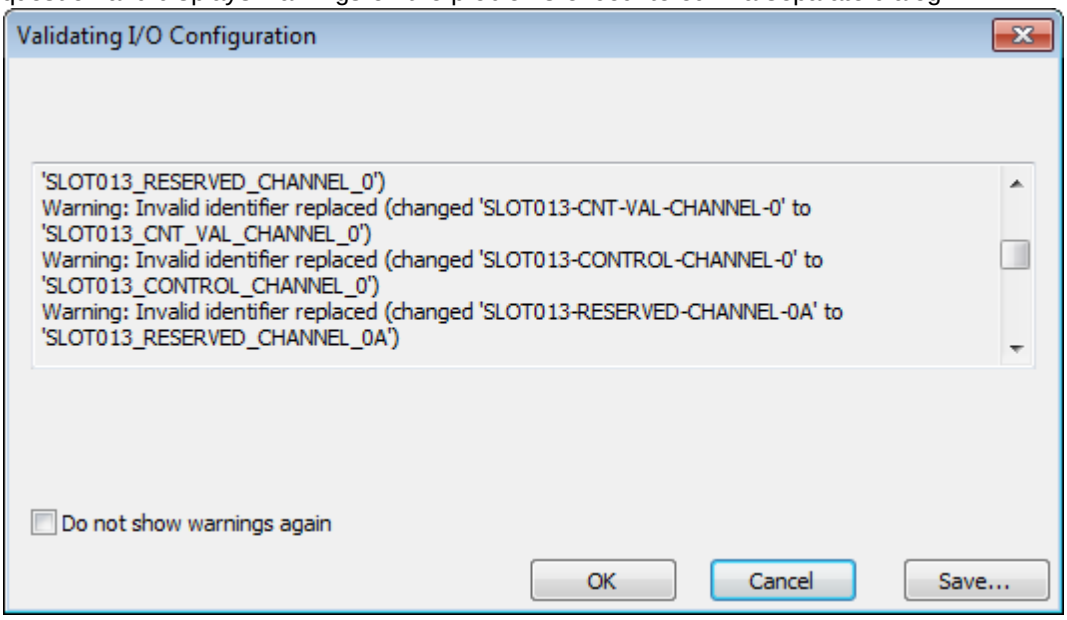

Outputs
Buffer Words Start End
PROFINET Manage... 118 Y100 Y85F
Acyclic Buffer 2100 D10 D2109
Cyclic Output 14 D4542 D4555
Inputs
Buffer Words Start End
PROFINET Manage... 112 X200 X8FF
Acyclic Buffer 2442 D2100 D4541
Cyclic Input 14 D4556 D4569

## Validation of IO Identifiers

Both functions 'IO Documentation' and 'Export PLC Code' validate the identifiers used in the IO configuration. These identifiers include the names of DUT elements listed in the 'Items' tables as well as the global variable names of the instances of these DUTs. The identifiers must conform to specification IEC 61131. Some of the restrictions checked are:

- global variable names must be unique within the PLC project
- identifiers must not exceed 32 characters in length
- identifiers must not contain 'hyphen' characters
- identifiers must not contain multiple consecutive underscores and must not end with one

If any of these restrictions are violated, GX Configurator-PN attempts to modify the identifiers in question and displays warnings on the problems encountered in a separate dialog.


Validating I/O Configuration
'SLOT013_RESERVED_CHANNEL_0')
Warning: Invalid identifier replaced (changed 'SLOT013-CNT-VAL-CHANNEL-0' to 'SLOT013_CNT_VAL_CHANNEL_0')
Warning: Invalid identifier replaced (changed 'SLOT013-CONTROL-CHANNEL-0' to 'SLOT013_CONTROL_CHANNEL_0')
Warning: Invalid identifier replaced (changed 'SLOT013-RESERVED-CHANNEL-0A' to 'SLOT013_RESERVED_CHANNEL_0A')
Do not show warnings again
OK
Cancel
Save...

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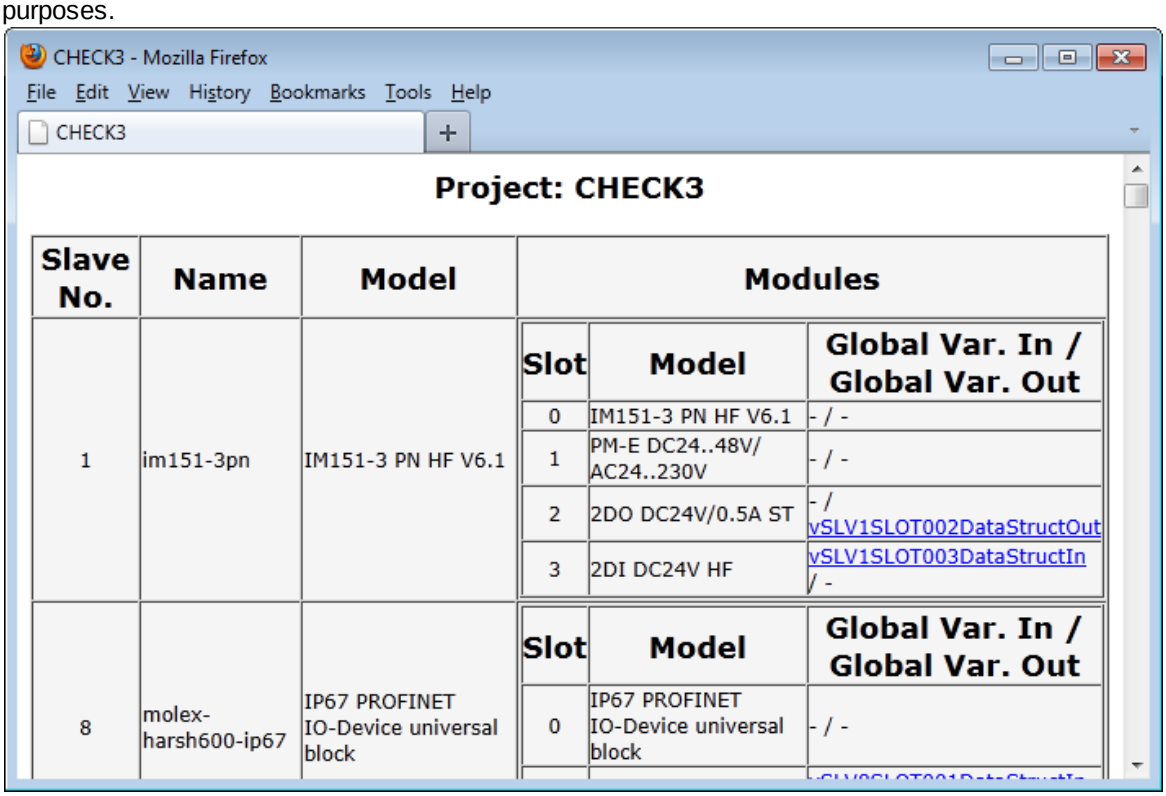
| Name | Description | Choices / Range | Default |
|---|---|---|---|
| List | Messages on violations to IEC 61131 restrictions | - | - |
| Do not show warnings again | If checked, this dialog is no longer displayed, when warnings are encountered, but the respective function (documentation or POU export) is directly executed.<br>**Note**: this option is de-selected, when the program is restarted. | selected / not selected | not selected |
| OK | Close dialog and proceed | - | Default button |
| Cancel | Close dialog and do not display IO documentation or export PLC code | - | - |
| Save | Store the displayed messages in a text file | - | - |

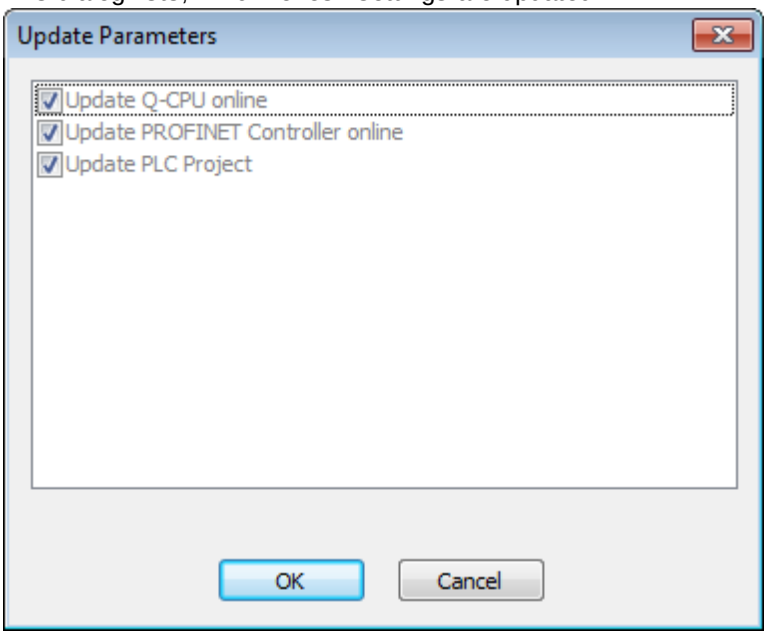
## IO Documentation

An HTML document with the global variables and corresponding buffer devices is generated and displayed in the default web browser. The document can be saved or printed for documentation purposes.



### 7.10.1 'Update Parameters' Dialog

This dialog lists, which refresh settings are updated.




| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Update Q-CPU online | If selected, the refresh settings in the parameter file on the CPU are updated | read-only | selected |
| Update PROFINET Controller online | If selected, the refresh settings in the parameter file on the PROFINET Controller are updated via FTP<br>If the FTP connection has not been enabled, this item is not selected | read-only & selected / unselected | selected |
| Update PLC Project | If selected, the parameter file in the assigned GD/GID project is updated<br>If no GD/GID project has been assigned, this item is unselected. | read-only & selected / unselected / | selected , if project path set |
| OK | Close dialog and save changes | - | Default button |
| Cancel | Close dialog and discard changes | - | - |

For the data transfer between Qn-CPU and PROFINET Controller both must contain matching refresh settings. Therefore in general both Qn-CPU and PROFINET Controller should be updated simultaneously.

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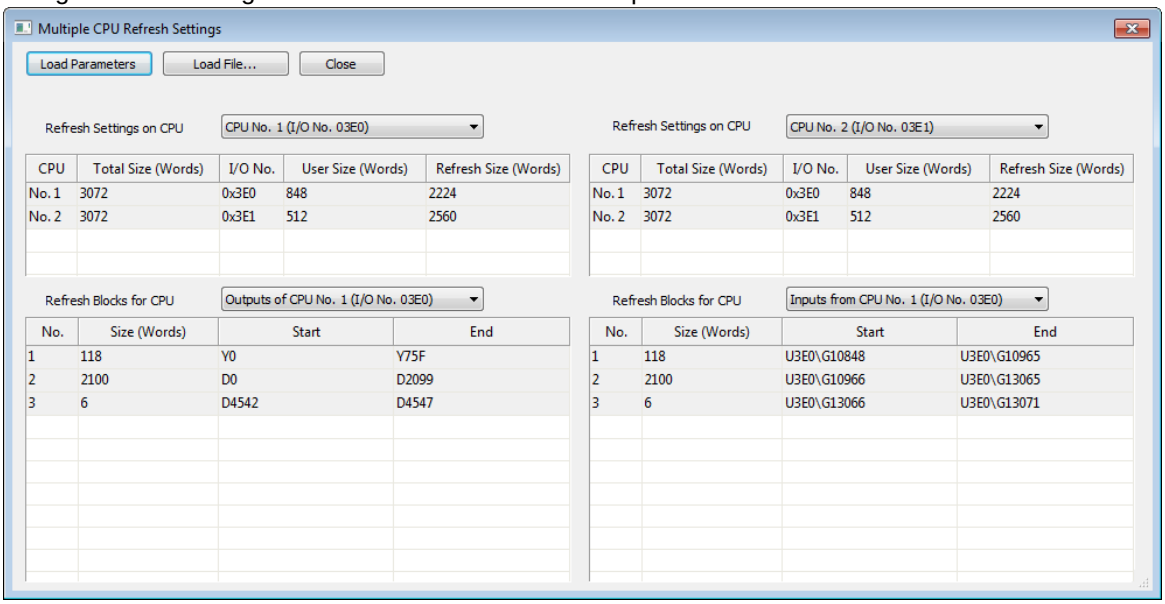
## 7.10.2 'Multiple CPU Refresh Settings' Dialog

The refresh settings on the controlling Qn-CPU and on the PROFINET Controller can also be modified via the PLC programming software. In order to control the actually existing settings, this dialog lists the settings on all CPUs or in the selected parameter file.


Multiple CPU Refresh Settings
Load Parameters
Load File...
Close
Refresh Settings on CPU
CPU No. 1 (I/O No. 03E0)
CPU Total Size (Words) I/O No. User Size (Words) Refresh Size (Words)
No. 1 3072 0x3E0 848 2224
No. 2 3072 0x3E1 512 2560
Refresh Settings on CPU
CPU No. 2 (I/O No. 03E1)
CPU Total Size (Words) I/O No. User Size (Words) Refresh Size (Words)
No. 1 3072 0x3E0 848 2224
No. 2 3072 0x3E1 512 2560
Refresh Blocks for CPU
Outputs of CPU No. 1 (I/O No. 03E0)
No. Size (Words) Start End
1 118 Y0 Y75F
2 2100 D0 D2099
3 6 D4542 D4547
Refresh Blocks for CPU
Inputs from CPU No. 1 (I/O No. 03E0)
No. Size (Words) Start End
1 118 U3E0\G10848 U3E0\G10965
2 2100 U3E0\G10966 U3E0\G13065
3 6 U3E0\G13066 U3E0\G13071

| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Load Parameters | reads the refresh settings from the parameter files on the Q-CPU and the PROFINET Controller | - | - |
| Load File | After selecting a GD/GID parameter file in a file dialog, the contents of the parameter file are displayed | - | - |
| Close | Close dialog | - | - |
| Refresh Settings on CPU | Lists those CPUs, from which the parameter file with the refresh settings, could be read | 0x3E0, 0x3E1, 0x3E2, 0x3E3<br>If the CPU has settings | 0x3E0 |
| Refresh Settings Table | Shows the sections in the high-speed data transfer area from the parameter file on the Q-CPU | - | - |
| Refresh Blocks for CPU | Select the CPU, for which the refresh blocks from the selected parameter file should be displayed in the table underneath | 0x3E0, 0x3E1, 0x3E2, 0x3E3 | 0x3E0 |
| Refresh Blocks | Shows the sections in the high-speed data | - | - |

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| Name | Description | Choices / Range | Default |
|---|---|---|---|
| Table | transfer area from the parameter file on the PROFINET Controller | | |
| The selection lists and tables on the left and on the right side are equivalent. By doubling the tables the user can visually compare settings in two different CPUs. | | | |

### 'Refresh Settings' Table

| CPU | Total Size (Words) | I/O No. | User Size (Words) | Refresh Size (Words) |
|---|---|---|---|---|
| No. 1 | 3072 | 0x3E0 | 848 | 2224 |
| No. 2 | 3072 | 0x3E1 | 512 | 2560 |

| Column | Description |
|---|---|
| CPU | CPU index |
| Total Size | Total used size (user and refresh area) |
| I/O No. | I/O number of CPU (as multiple of 0x10) |
| User Size (Words) | Size of user area (not used for automatic data transfer) |
| Refresh Size (Words) | Size of area used for data transfer between Q-CPU and PROFINET Controller |

### 'Refresh Blocks' Table

The refresh settings for Q-CPUs show buffer devices

| No. | Size (Words) | Start | End |
|---|---|---|---|
| 1 | 118 | Y0 | Y75F |
| 2 | 2100 | D0 | D2099 |
| 3 | 6 | D4542 | D4547 |

while the refresh settings for CCPUs (like the PROFINET Controller) show shared memory addresses in 'U<n>\G<m>' notation.

| No. | Size (Words) | Start | End |
|---|---|---|---|
| 1 | 118 | U3E0\G10848 | U3E0\G10965 |
| 2 | 2100 | U3E0\G10966 | U3E0\G13065 |
| 3 | 6 | U3E0\G13066 | U3E0\G13071 |

| Column | Description |
|---|---|
| No. | CPU index |
| Size (Words) | Size of refresh block in words |
| Start | for Q-CPU: start device |

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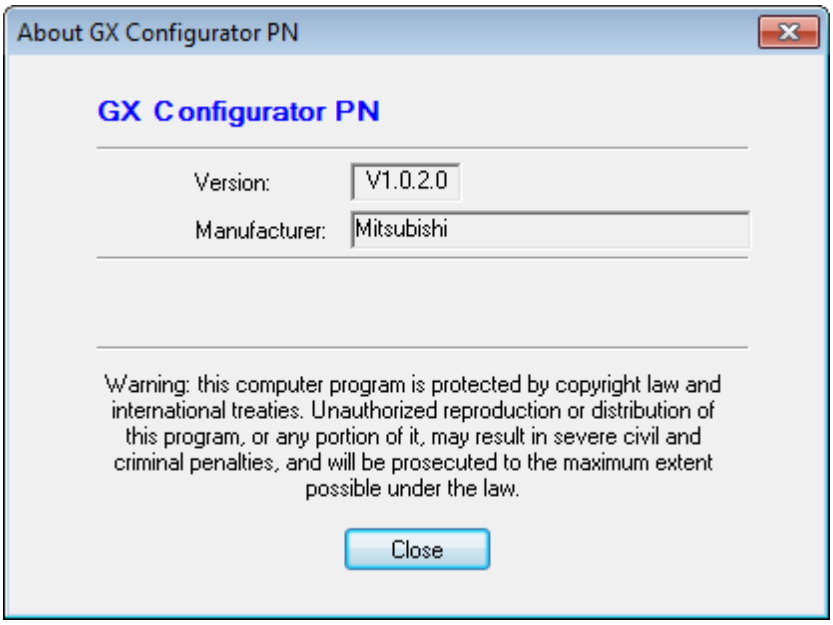
| Column | Description |
|---|---|
| | for PN controller: start address in shared memory |
| End | for Q-CPU: end device<br>for PN controller: end address in shared memory |

## 7.11 Aboutbox

The 'about box' shows the version and copyright notice.


About GX Configurator PN
GX Configurator PN
Version:
V1.0.2.0
Manufacturer:
Mitsubishi
Warning: this computer program is protected by copyright law and international treaties. Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under the law.
Close

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# 8 PLC Code for PROFINET Controller

GX Configurator-PN can export PLC program code for 'GX Works2' (GXW2) and 'GX IEC Developer' (GID), which assists the application programmer in accessing the PROFINET Controller. The exported code consists of an ASCII-file (.asc) and two user libraries (.sul).

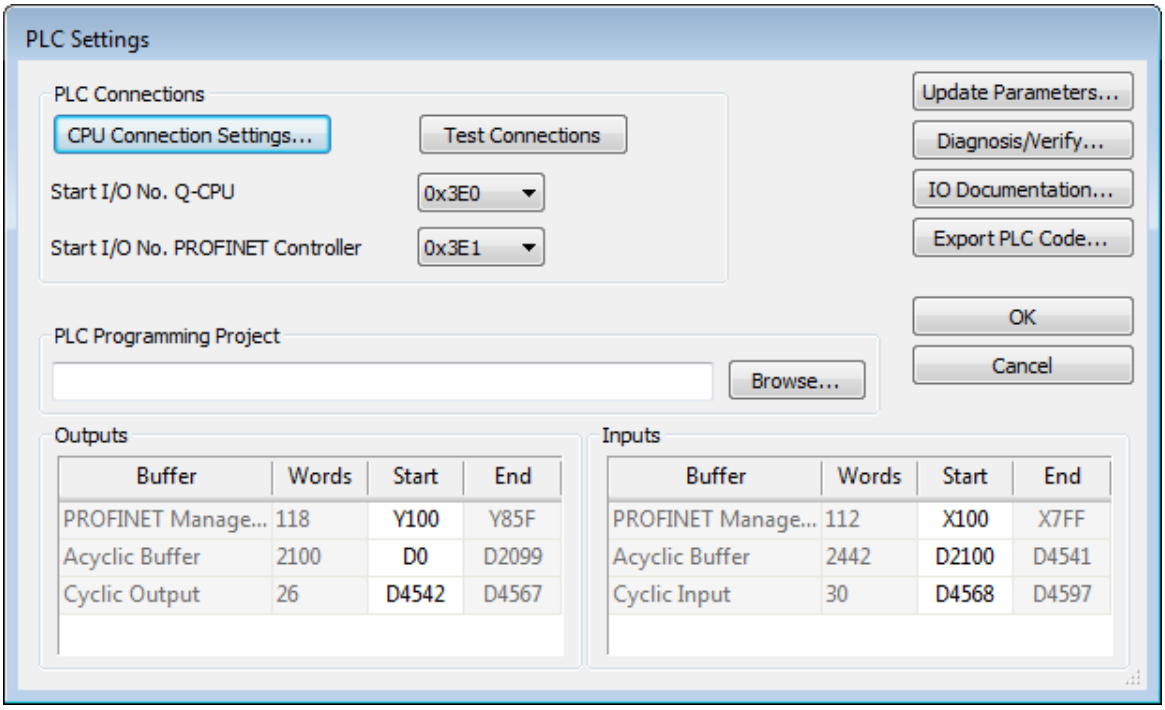
| File Name | Contents |
|---|---|
| <user chosen>.asc | ASCII file for import in PLC project with task definition and the references to the user libraries |
| <user chosen>.sul | project specific DUTs for IO-devices and global variables mapped to buffer devices |
| pnfb_base_types.sul | project-independent user library with standard DUTs for management and acyclic communication and function blocks for access to PROFINET services |

## 8.1 Function Blocks

GX Configurator-PN can export PLC code for integrating access to the PROFINET I/O network into the PLC application program. The exported code can be imported in 'GX Works2' (GXW2) and 'GX IEC Developer' (GID) projects. The exported code consists of 'Function Blocks' (FBs), 'Data Unit Types' (DUTs) and global variable lists (GVLs).

### Assigning Addresses to the DUT Instances

After completing the network configuration within GX Configurator-PN the user must assign the buffer device addresses to the instances of the DUTs. The addresses are taken from the 'PLC Settings' dialog shown below:




### Call of Function Blocks

All services used in the function blocks access the same data area, defined in the instances of the

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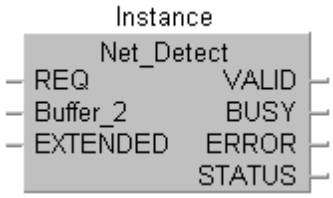
DUTs. If there is one function block in use (output “Busy” is true), no other function block call is allowed. The user must ensure that the function blocks are interlocked against simultaneous use. Two function blocks can only be used simultaneously, if one uses a different request/response buffer pair than the other.

GX Configurator-PN adds global variables to the exported PLC code, which are mapped to the corresponding buffer devices. The PLC program can use the variable identifiers and does not have to include the buffer devices directly. The following table lists the variable names for both acyclic communication buffer pairs.

| Buffer | Global Variables for Acyclic Communication Buffers | |
|---|---|---|
| | Buffer Pair 1 | Buffer Pair 2 |
| Request handshake bits | vPN_MGMT_OUTPUTS.ACYC_HSK_Y_REQ1_EXECUTE | vPN_MGMT_OUTPUTS.ACYC_HSK_Y_REQ2_EXECUTE |
| Response handshake bits | vPN_MGMT_INPUTS.ACYC_HSK_X_RES1_ACCEPTED<br>vPN_MGMT_INPUTS.ACYC_HSK_X_RES1_COMPLETED | vPN_MGMT_INPUTS.ACYC_HSK_X_RES2_ACCEPTED<br>vPN_MGMT_INPUTS.ACYC_HSK_X_RES2_COMPLETED |
| Request buffer | vPN_ACYCLIC_REQ1 | vPN_ACYCLIC_REQ2 |
| Response buffer | vPN_ACYCLIC_RES1 | vPN_ACYCLIC_RES2 |

### 8.1.1 Function Block 'Net_Detect'

This FB detects IO-devices present on the network. It includes two services: network detection and IO-device detection. The network detection returns only the number of IO-devices found on the network. The following IO-Device detection reads type information from each detected IO-device and stores it in the global variable 'vPN_DEVICE_DETECT_DATA'.




| Variable | Class | Type | Description |
|---|---|---|---|
| REQ | Input | Bool | Start the network detection |
| BUFFER_2 | | Bool | 0= Buffer 1 for acyclic request is used<br>1= Buffer 2 for acyclic request is used |
| EXTENDED | | Bool | 0= Only the standard information (first eight words) is returned<br>1= The extended device information is returned |
| VALID | Output | Bool | Data in the global variable 'vPN_DEVICE_DETECT_DATA' |

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| Variable | Class | Type | Description |
|---|---|---|---|
| | | | is valid |
| BUSY | | Bool | The function block is in use |
| ERROR | | Bool | Error detected |
| STATUS | | Word | Last detected status, possible values:<br>0= Status OK<br>1= Profinet stack not started<br>4= Reception buffer too small (stack internal error)<br>5= No more IO-device<br>6= ”Network detection” service never called |

The global variable 'vPN_DEVICE_DETECT_DATA' is defined as an array of DUTs (the DUT type name is 'vPN_DEVICE_DETECT_DATA'). The number of devices in the network equals the number of array elements.

## Standard Device Information (Input 'EXTENDED' is not set)

If 'EXTENDED' has been set to 'FALSE', only standard device data is returned. For each detected device the variable 'vPN_DEVICE_DETECT_DATA' contains the following information:

| Variable Pos Offset | ID | Value |
|---|---|---|
| 1 | VendorID | VendorID of the device |
| 2 | DeviceID | DeviceID of the device |
| 3 | IP_Address | IP address of the Device |
| 4 | Subnetmask | Subnet mask of the Device |
| 5 | Gateway | Gateway IP Address of the Device |
| 6 | Mac_Address_Bytes1_2 | Mac Address of the Device, first word |
| 7 | Mac_Address_Bytes3_4 | Mac Address of the Device, second word |
| 8 | Mac_Address_Bytes5_6 | Mac Address of the Device, third word |

## Extended Device Information (Input 'EXTENDED' is set)

If 'EXTENDED' has been set to 'TRUE', additional device data is returned. The DUT 'tPN_DEVICE_DETECT_DATA' must be expanded by appending an 'ARRAY [0..134] OF WORD' to the standard structure. For each detected device the variable 'vPN_DEVICE_DETECT_DATA' contains the following information:

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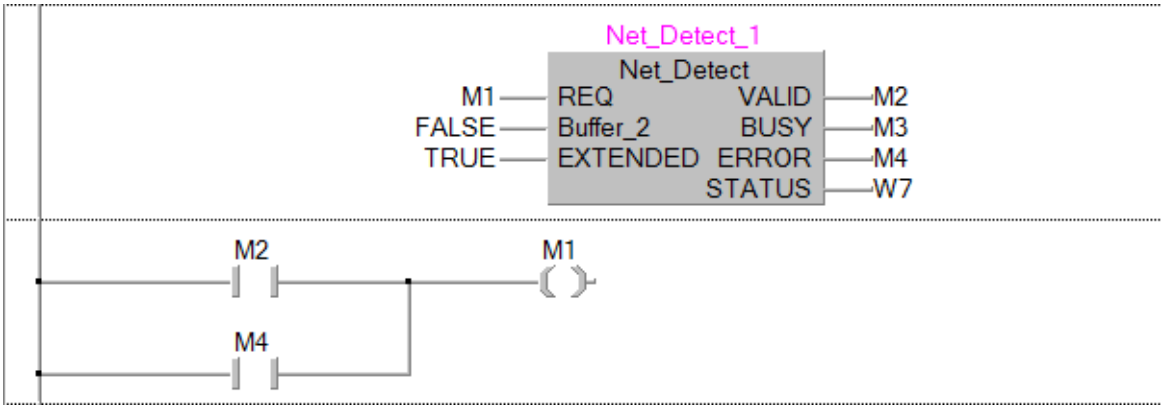
| Variable Pos Offset | ID | Value |
|---|---|---|
| 1 | VendorID | VendorID of the device |
| 2 | DeviceID | DeviceID of the device |
| 3 | IP_Address | IP address of the Device |
| 4 | Subnetmask | Subnet mask of the Device |
| 5 | Gateway | Gateway IP Address of the Device |
| 6 | Mac_Address_Bytes1_2 | Mac Address of the Device, first word |
| 7 | Mac_Address_Bytes3_4 | Mac Address of the Device, second word |
| 8 | Mac_Address_Bytes5_6 | Mac Address of the Device, third word |
| 9 | Data[0] | Size of the device name (240 bytes max) |
| 10 | Data[1] | Device name |
| 9 + n | Data[n] | Size of “Type” field (25 bytes max) |
| 10 + n | Data[n+1] | Type of Device |

**Note**: the IO-devices are returned in the order, in which they answered to the DCP identify request. Two consecutive calls to 'Net_Detect' can result in two different lists.

## Call FB 'Net_Detect'




By setting M1 the network detection is started. M2 shows that the network detection data was written to the global variable 'vPN_DEVICE_DETECT_DATA'.

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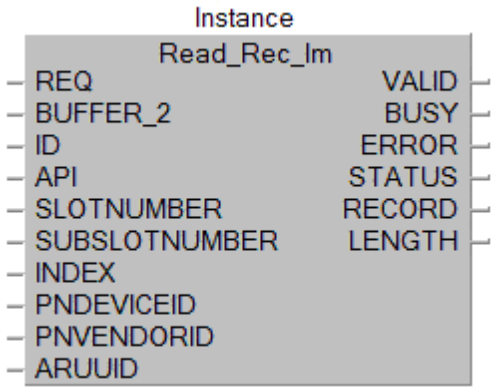
### 8.1.2 Function Block 'Read_Rec_Im'

This FB reads information from an IO-device, which has not been included in the configuration of the PROFINET Controller.




| Variable | Class | Type | Description |
|---|---|---|---|
| REQ | Input | Bool | Start read record |
| BUFFER_2 | | Bool | 0=Buffer 1 for acyclic request is used<br>1=Buffer 2 for acyclic request is used |
| ID | | DWord | Device-ID, shall contain the IP-Address |
| API | | DWord | API number, used to perform the read |
| SLOTNUMBER | | Word | Slot number target |
| SUBSLOTNUMBER | | Word | Sub-slot number target |
| INDEX | | Word | Index of the record block |
| PNDEVICEID | | Word | PN-Device ID (taken from the GSDML-file) |
| PNVENDORID | | Word | Vendor ID (taken from the GSDML-file) |
| ARUUID | | Word | Object UUID Local ID (taken from the GSDML-file) |
| VALID | Output | Bool | Data in the global variable “DEVICE_DATA” is valid |
| BUSY | | Bool | The function block is in use |
| ERROR | | Bool | Error detected |
| STATUS | | Word | Last detected status, possible values:<br>0=Status OK<br>1=Profinet stack not started |

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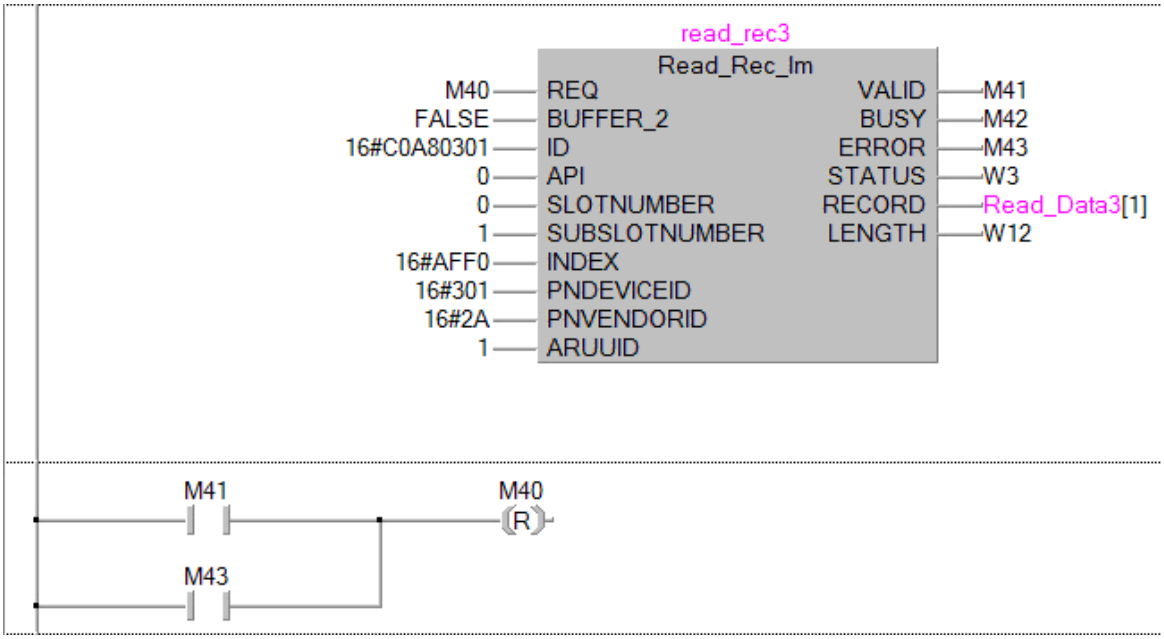
| Variable | Class | Type | Description |
|---|---|---|---|
| | | | 2= No Ethernet link<br>3= No IO-Device detected<br>4=Reception buffer too small (stack internal error)<br>8= Profinet error |
| RECORD | | Word | Read data |
| LENGTH | | Int | Read data size in byte |

The read data is moved to the output 'RECORD' by using a block move operation. The user has to configure an array-Variable for this output with the corresponding number of elements.

## Call FB 'Read_Rec_Im'




The input 'ID' contains the IP-address of the IO-device: 16#C0A80301 = 192.168.3.1. The index for the read data is 16#AFF0, indicating to read the I&M data (Identification & Maintenance) of the device. By setting M40 the reading of the data is started. M41 indicates that the read data has been written to the global variable 'Read_Data3'. The values for the inputs PNDEVICEID, PNVENDORID and ARUUID are taken from the GSDML-file.

| FB Input | GSDML Node and Attribute |
|---|---|
| PNDEVICEID | DeviceIdentity/@VendorID |
| PNVENDORID | DeviceIdentity/@DeviceID |
| ARUUID | DeviceAccessPointItem/@ObjectUUID_LocalIndex |

Extract from the sample GSDML-file used for the FB call above:

```
<ProfileBody>
```

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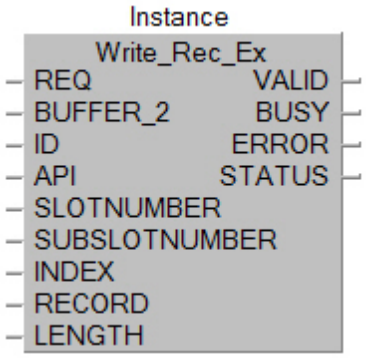
```
  <DeviceIdentity VendorID="0x002A" DeviceID="0x0301">
    <ApplicationProcess>
      <DeviceAccessPointList>
        <DeviceAccessPointItem ID="DIM 1" PhysicalSlots="0..63"
           ModuleIdentNumber="0x00000300" MinDeviceInterval="32"
           ImplementationType="NetArm" DNS_CompatibleName="IM151-3PN"
FixedInSlots="0"
           ObjectUUID_LocalIndex="1">
```

### 8.1.3 Function Block 'Write_Rec_Ex'

This FB writes data to an IO-Device which is connected to the Profinet.




| Variable | Class | Type | Description |
|---|---|---|---|
| REQ | Input | Bool | Start write record |
| BUFFER_2 | | Bool | 0=Buffer 1 for acyclic request is used<br>1=Buffer 2 for acyclic request is used |
| ID | | DWord | Device-ID, shall contain the IP-Address |
| API | | DWord | API number, used to perform the read |
| SLOTNUMBER | | Word | Slot number target |
| SUBSLOTNUMBER | | Word | Sub-slot number target |
| INDEX | | Word | Index of the record block |
| RECORD | | Word | Write data |
| LENGTH | | Int | Write data size in byte |
| VALID | Output | Bool | Data in the global variable “DEVICE_DATA” is valid |
| BUSY | | Bool | The function block is in use |
| ERROR | | Bool | Error detected |

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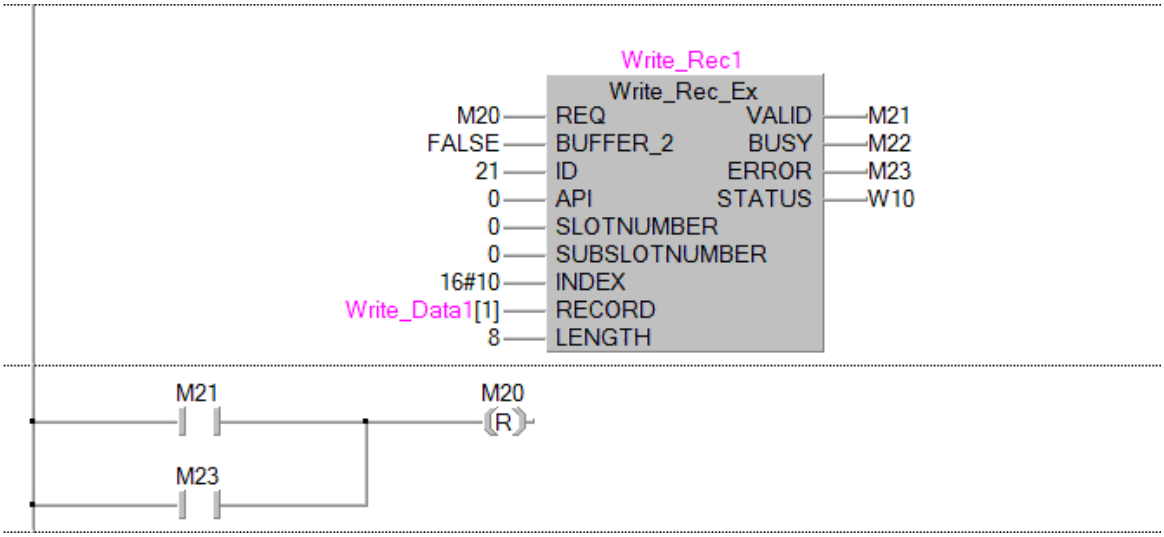
| Variable | Class | Type | Description |
|---|---|---|---|
| STATUS | | Word | Last detected status, possible values:<br>0= Status OK<br>1= Profinet stack not started<br>2= No Ethernet link<br>3= No IO-Device detected<br>6= Device not connected<br>7= Device not configured<br>8= Profinet error |

The data to write is moved from the input 'RECORD' by using a block move operation to the transfer buffer. The user has to configure an array variable for this input with the corresponding number of elements.

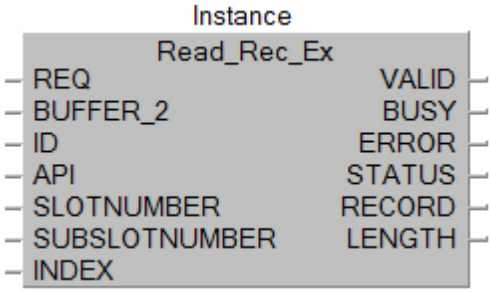
### Call FB 'Write_Rec_Ex'




The input 'ID' contains the IO-device number '21'. The index for the data to write to is 16#10. By setting M40 the writing of the data is started. M41 indicates that the data from the global variable 'Write_Data1' has been successfully transferred to the IO-device.

## 8.1.4 Function Block 'Read_Rec_Ex'

This FB reads information from an IO-Device which is connected to the Profinet.

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| Variable | Class | Type | Description |
|---|---|---|---|
| REQ | Input | Bool | Start read record |
| BUFFER_2 | | Bool | 0=Buffer 1 for acyclic request is used<br>1=Buffer 2 for acyclic request is used |
| ID | | DWord | Device-ID, shall contain the IP-Address |
| API | | DWord | API number, used to perform the read |
| SLOTNUMBER | | Word | Slot number target |
| SUBSLOTNUMBER | | Word | Sub-slot number target |
| INDEX | | Word | Index of the record block |
| VALID | Output | Bool | Data in the output “RECORD” is valid |
| BUSY | | Bool | The function block is in use |
| ERROR | | Bool | Error detected |
| STATUS | | Word | Last detected status, possible values:<br>0= Status OK<br>1= Profinet stack not started<br>2= No Ethernet link<br>3= No IO-Device detected<br>4= Reception buffer too small (stack internal error)<br>6= Device not connected<br>7= Device not configured<br>8= Profinet error |
| RECORD | | Word | Read data |
| LENGTH | | Int | Read data size in byte |

The read data is moved to the output 'RECORD' by using a block move operation. The user has to configure an array variable for this output with the corresponding number of elements.

## Call FB 'Read_Rec_Ex'

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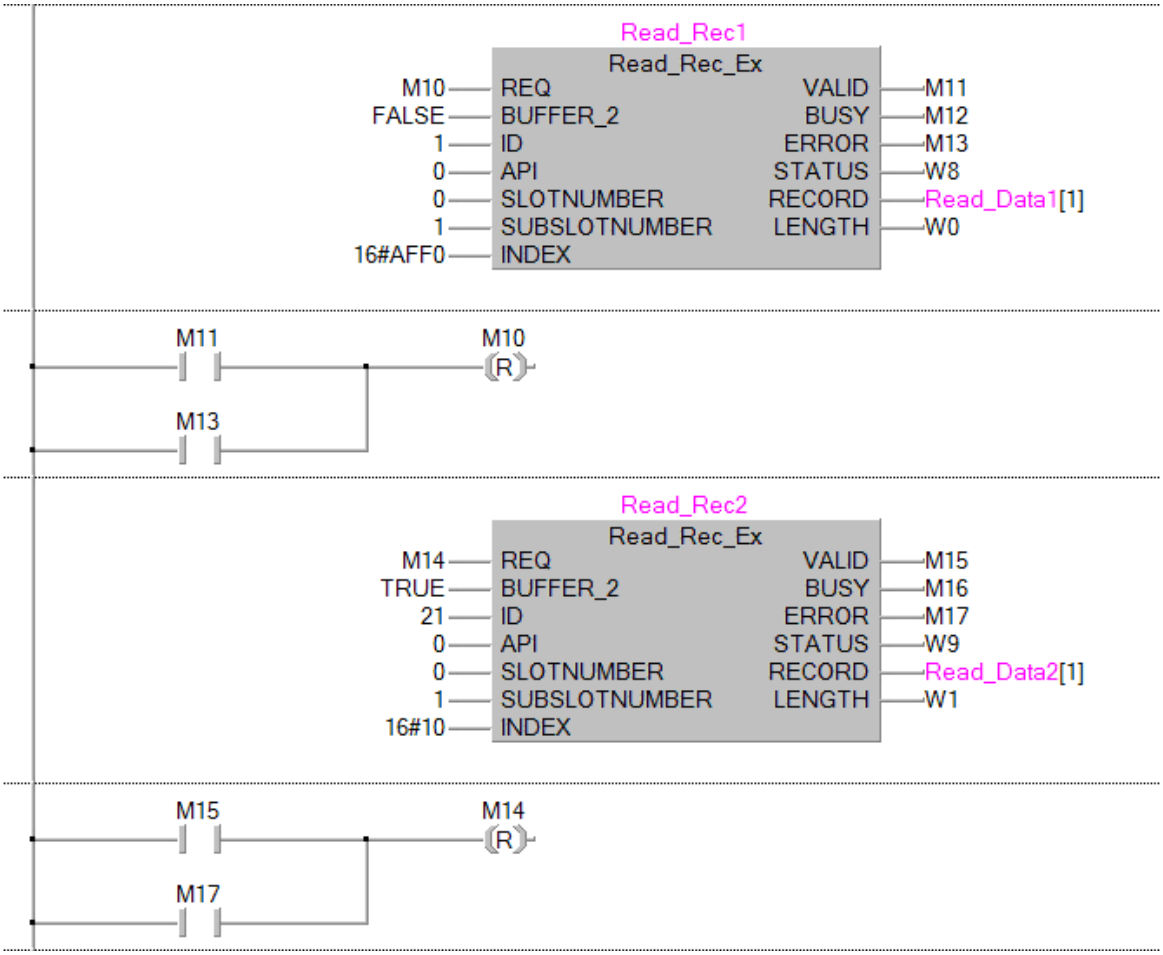
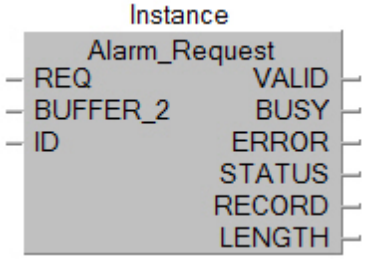



**First call:**
The index for the read data is 16#AFF0, indicating to read the I&M data (Identification & Maintenance) of the device. The first acyclic buffer is used.
By setting M10 reading the data is started. M11 indicates that the read data has been written to the global variable 'Read_Data1'.

**Second call:**
The index for the read data is 16#10, indicating to read the parameter data from index 10 of the device. The second acyclic buffer is used.
By setting M14 reading the data is started. M15 indicates that the read data has been written to the global variable 'Read_Data2'.

## 8.1.5 Function Block 'Alarm_Request'

With this function block the PLC program requests an alarm received from a specific IO-device.



| Variable | Class | Type | Description |
|---|---|---|---|
| REQ | Input | Bool | Start alarm request |
| BUFFER_2 | | Bool | 0=Buffer 1 for acyclic request is used<br>1=Buffer 2 for acyclic request is used |
| ID | | DWord | Device-ID, shall contain the IP-Address |
| VALID | Output | Bool | Data in the output “RECORD” is valid |
| BUSY | | Bool | The function block is in use |
| ERROR | | Bool | Error detected |
| STATUS | | Word | Last detected status, possible values:<br>0= Status OK<br>1= Profinet stack not started<br>7= Device not configured<br>8= Profinet error<br>9= No Alarm for this device |
| RECORD | | Word | Read data |
| LENGTH | | Int | Read data size in byte |

The read alarm data is moved to the output 'RECORD' by using a block move operation. The user has to configure an array variable for this output with the corresponding number of elements.

| Word Offset | ID | Value |
|---|---|---|
| 0 | API | API number used to perform the alarm |
| 1 | | |
| 2 | Priority | Alarm priority<br>High priority: 0x06<br>Low priority: 0x05 |
| 3 | Type | Alarm type |
| 4 | Slot number | Slot number of the alarm |
| 5 | SubSlot number | Subslot number of the alarm |
| 6 | Specifier | Alarm specifier |
| 7 | Module ident number | Module ID of the Alarm |
| 8 | | |
| 9 | SubModule ident number | Submodule ID of the Alarm |
| 10 | | |
| 11 | Data length | Data Size in byte |
| 12 + Data length / 2 - 1 | Data | 0 to 1432 bytes |

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**Alarm Types**

| Value (hex) | ID |
|---|---|
| 0x0000 | Reserved |
| 0x0001 | Diagnosis |
| 0x0002 | Process |
| 0x0003 | Pull |
| 0x0004 | Plug |
| 0x0005 | Status |
| 0x0006 | Update |
| 0x0007 | Media Redundancy |
| 0x0008 | Controlled by supervisor. Logical “Pull” of a submodule to withdraw ownership |
| 0x0009 | Released. Logical “Plug” of a submodule to return ownership or trigger a reparameterization |
| 0x000A | Plug Wrong Submodule |
| 0x000B | Return of Submodule |
| 0x000C | Diagnosis disappears |
| 0x000D | Multicast communication mismatch notification |
| 0x000E | Port data change notification |
| 0x000F | Sync data changed notification |
| 0x0010 | Isochronous mode problem notification |
| 0x0011 | Network component problem notification |
| 0x0012 | Time data changed notification |
| 0x0013 | Dynamic Frame Packing problem notification |
| 0x0014 | MRPD problem notification |
| 0x0015 | System Redundancy |
| 0x0016 - 0x001D | Reserved |
| 0x001E | Upload and retrieval notification |
| 0x001F | Pull module |

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| Value (hex) | ID |
|---|---|
| 0x0020 - 0x007F | Manufacturer specific |
| 0x0080 - 0x00FF | Reserved for profiles |
| 0x0100 - 0xFFFF | Reserved |

**Alarm Specifier**

| Bits | Description | Value |
|---|---|---|
| 0 - 10 | Sequence number | 0 to 2,047, incremented upon each indication |
| 11 | Diagnosis channel | 0x00: No diagnosis available<br>0x01: Diagnosis available |
| 12 | Specific diagnosis | 0x00: No diagnosis available<br>0x01: Diagnosis available |
| 13 | Diagnosis sub-module | 0x00: No diagnosis available<br>0x01: Diagnosis available |
| 14 | Reserved | 0x00 |
| 15 | AR diagnosis | 0x00: No diagnosis available<br>0x01: Diagnosis available |

### Alarm Management

By default the PROFINET stack can handle alarms automatically without reporting any indication to the PLC program. The PLC program can overwrite this default setting per device in order to manage alarms for a device by itself. To select 'manual handling' for alarms of a specific device a bit, which corresponds to the device, must be set in the global variable 'vPN_MGMT_OUTPUTS', which contains the PROFINET management output structure.

| Alarm Handling | Variable Setting |
|---|---|
| Automatic handling | vPN_MGMT_OUTPUTS.IOD_MGT_ALARM[device index] = 0 |
| Manual handling | vPN_MGMT_OUTPUTS.IOD_MGT_ALARM[device index] = 1 |

If automatic handling has been selected for an IO-device, the IO-controller automatically acknowledges each alarm received from the respective IO-device and the alarm indication flags 'vPN_MGMT_INPUTS.IOD_ALARM_IND' are not used. If manual handling has been selected, an alarm indication is passed to the PLC program by setting the bit with the index of the respective IO-device in 'vPN_MGMT_INPUTS.IOD_ALARM_IND[device index]'.

## Call FB 'Alarm_Request'

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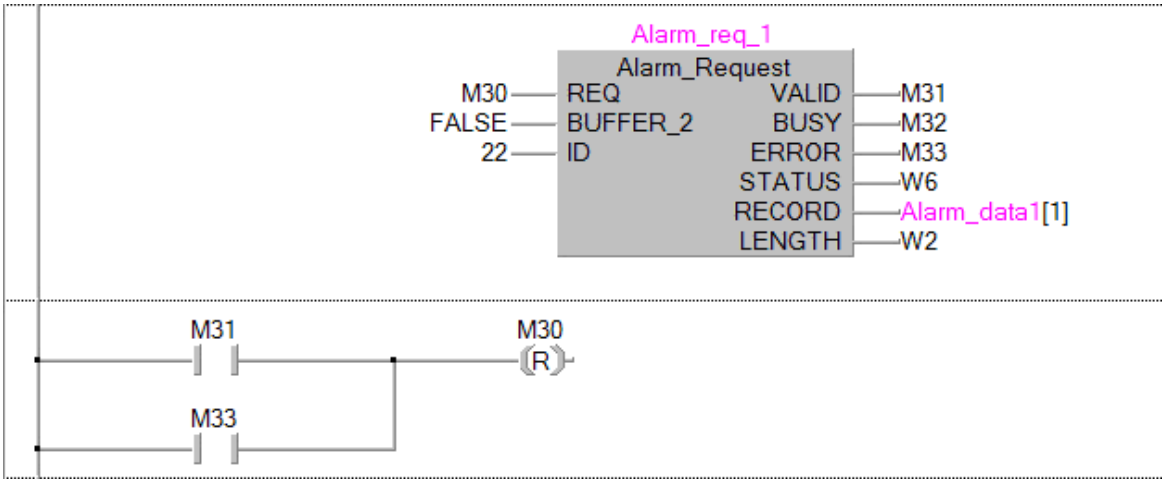
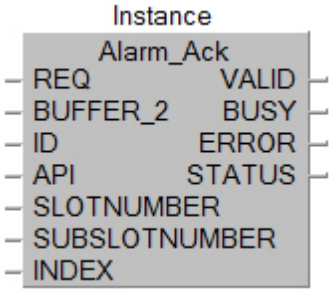



The input 'ID' contains the IO-device number '22'. By setting M30 the alarm request is started. M31 indicates that the requested data has been written to the global variable 'Alarm_data1'. This function block accesses the global variables 'vPN_MGMT_INPUTS' and vPN_MGMT_OUTPUTS.

### 8.1.6 Function Block 'Alarm_Ack'

This function block sends the 'acknowledge alarm' frame to the IO-device.




| Variable | Class | Type | Description |
|---|---|---|---|
| REQ | Input | Bool | Start alarm ack. |
| BUFFER_2 | | Bool | 0=Buffer 1 for acyclic request is used<br>1=Buffer 2 for acyclic request is used |
| ID | | DWord | Device-ID, shall contain the IP-Address |
| API | | DWord | API number, used to perform the ack |
| SLOTNUMBER | | Word | Slot number target |
| SUBSLOTNUMBER | | Word | Sub-slot number target |
| INDEX | | Word | Must contain the alarm priority |
| VALID | Output | Bool | Ack has been send |
| BUSY | | Bool | The function block is in use |

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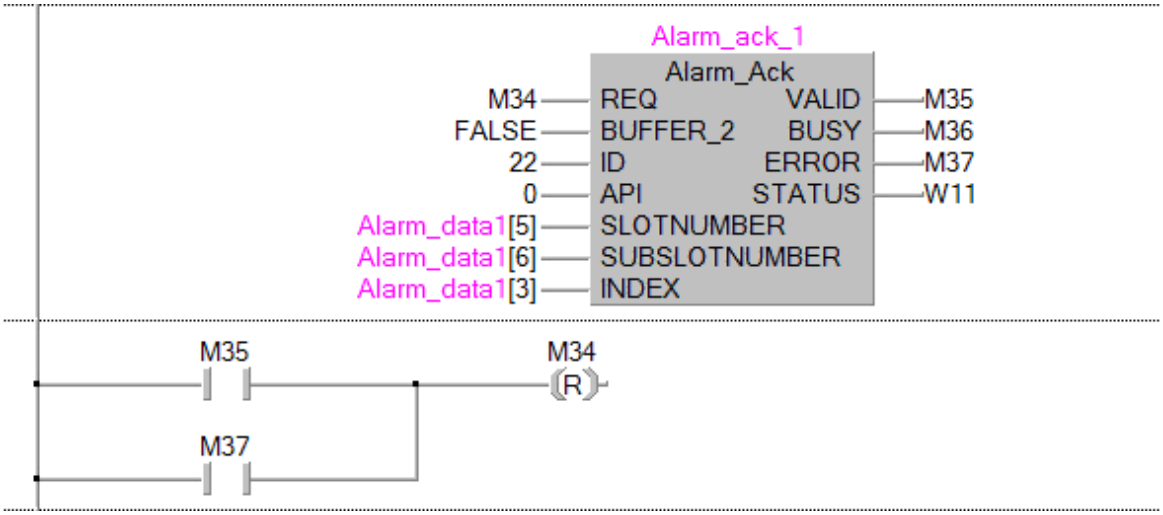
| Variable | Class | Type | Description |
|---|---|---|---|
| ERROR | | Bool | Error detected |
| STATUS | | Word | Last detected status, possible values:<br>0= Status OK<br>1= Profinet stack not started<br>7= Device not configured<br>8= Profinet error<br>9= No Alarm for this device |

## Call FB 'Alarm_Ack'




The input 'ID' contains the IO-device number '22'. By setting M34 the alarm acknowledge is started. M35 indicates that the acknowledge data has been written to the requested device. This function block accesses the global variables 'vPN_MGMT_INPUTS' and vPN_MGMT_OUTPUTS.

The data for the function block inputs 'SLOTNUMBER', 'SUBSLOTNUMBER' and 'INDEX' must come from the previous call to the function block 'Alarm_Request'. This is achieved by assigning to the inputs of 'Alarm_Ack' the same variable 'Alarm_data1', which has been assigned to the output 'RECORD' of the 'Alarm_Request' function block. The table below shows the structure of the 'Alarm_Request.RECORD' output data and its relation to the 'Alarm_Ack' function block.

| Word Offset | ID | Value | Variable | FB 'Alarm_Ack' Input |
|---|---|---|---|---|
| 0 | API | API number used to perform the alarm | Alarm_data1 [1] | |
| 1 | | | Alarm_data1 [2] | |
| 2 | Priority | Alarm priority<br>High priority: 0x06<br>Low priority: 0x05 | Alarm_data1 [3] | INDEX |
| 3 | Type | Alarm type | Alarm_data1 | |

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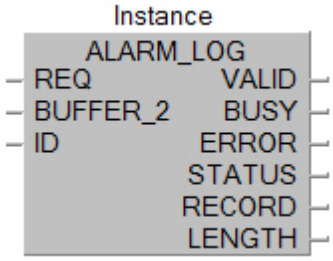
| Word Offset | ID | Value | Variable | FB 'Alarm_Ack' Input |
|---|---|---|---|---|
| | | | [4] | |
| 4 | Slot number | Slot number of the alarm | Alarm_data1 [5] | SLOTNUMBER |
| 5 | SubSlot number | Subslot number of the alarm | Alarm_data1 [6] | SUBSLOTNUMBER |

### 8.1.7 Function Block 'Alarm_Log'

This function block retrieves an alarm description from the internal alarm log. Each call of the function block retrieves only one alarm description. If several alarms are stored, the function block must be called multiple times. The oldest alarm is returned first.




| Variable | Class | Type | Description |
|---|---|---|---|
| REQ | Input | Bool | Start read alarm log |
| BUFFER_2 | | Bool | 0=Buffer 1 for acyclic request is used<br>1=Buffer 2 for acyclic request is used |
| ID | | DWord | Device-ID, shall contain the IP-Address |
| VALID | Output | Bool | Data in the output 'RECORD' is valid |
| BUSY | | Bool | The function block is in use |
| ERROR | | Bool | Error detected |
| STATUS | | Word | Last detected status, possible values:<br>0= Status OK<br>1= Profinet stack not started<br>2= No Ethernet link<br>7= Device not configured<br>8= Profinet error<br>9= No Alarm in log for this device |
| RECORD | | Word | Read data |

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| Variable | Class | Type | Description |
|---|---|---|---|
| LENGTH | | Int | Read data size in byte |

The read alarm log data is moved to the output 'RECORD' by using a block move operation. The user has to configure an array variable for this output with the corresponding number of elements.

| Word Offset | Value |
|---|---|
| 0 | Date of the ME1PN1FW-Q when the frame has been received |
| 1 | |
| 2 | Time of the ME1PN1FW-Q when the frame has been received |
| 3 | |
| 4 | Alarm Type |
| 5 | API number used to perform the alarm |
| 6 | |
| 7 | Alarm Priority |
| 8 | ID of the module. Manufacturer specific. |
| 9 | |
| 10 | ID of the submodule. Manufacturer specific. |
| 11 | |
| 12 | Slot number of the alarm |
| 13 | Subslot number of the alarm |
| 14 | Alarm specifier |

## Call FB 'Alarm_Log'

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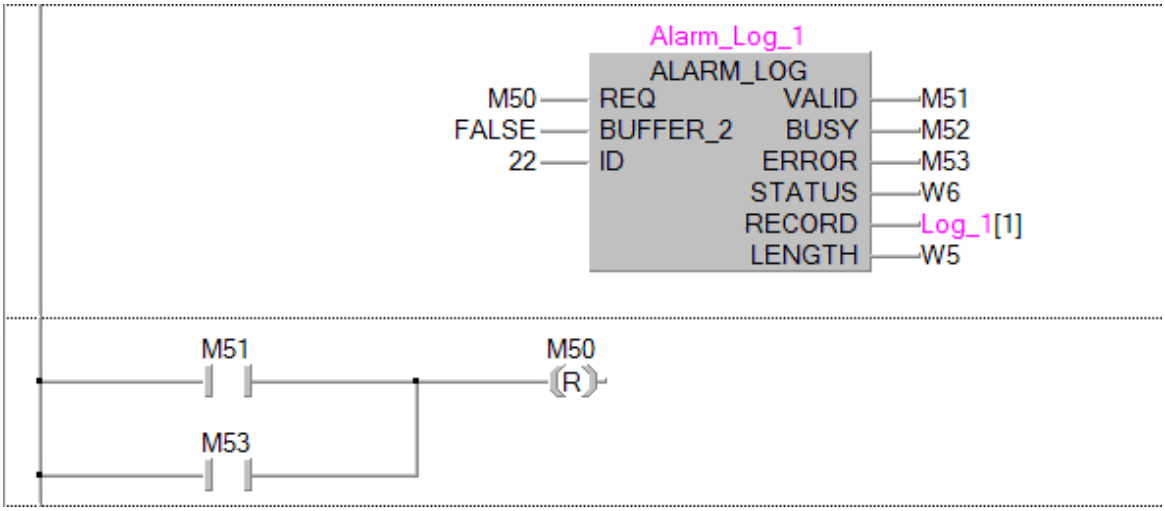
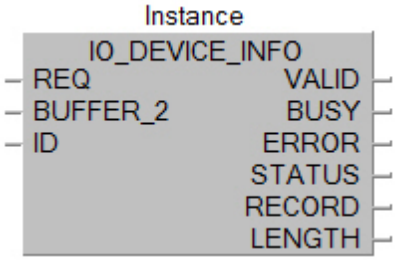



The input 'ID' contains the IO-device number '22'. By setting M50 the alarm request is started. M51 indicates that the requested data has been written to the global variable 'Log_1'.

### 8.1.8 Function Block 'IO_Device_Info'

This function block reads type information from the specified IO-device.




| Variable | Class | Type | Description |
|---|---|---|---|
| REQ | Input | Bool | Start read IO-device information |
| BUFFER_2 | | Bool | 0=Buffer 1 for acyclic request is used<br>1=Buffer 2 for acyclic request is used |
| ID | | DWord | Device-ID, shall contain the IP-Address |
| VALID | Output | Bool | Data in the output 'RECORD' is valid |
| BUSY | | Bool | The function block is in use |
| ERROR | | Bool | Error detected |
| STATUS | | Word | Last detected status, possible values:<br>0= Status OK<br>1= Profinet stack not started<br>10= Device not configured |

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| Variable | Class | Type | Description |
|---|---|---|---|
| RECORD | | Word | Read data |
| LENGTH | | Int | Read data size in byte |

The read IO-Device information data is moved to the output 'RECORD' by using a block move operation. The user has to configure an array variable for this output with the corresponding number of elements.

Content of the IO-Device information data:

| Word Offset | Value |
|---|---|
| 0 | MAC address |
| 1 | |
| 2 | |
| 3 | IP address |
| 4 | |
| 5 | Input area in High Speed Area |
| 6 | |
| 7 | Output area in High Speed Area |
| 8 | |
| 9 | Input length |
| 10 | Output length |
| 11 | Refresh period |
| 12 | Number of successful connections |
| 13 | Number of disconnections |
| 14 | State (Connected / Not Connected) |
| 15 | Management (Manual / Automatic) |
| 16 | Current Profinet Status |

## Call FB 'IO_Device_Info'

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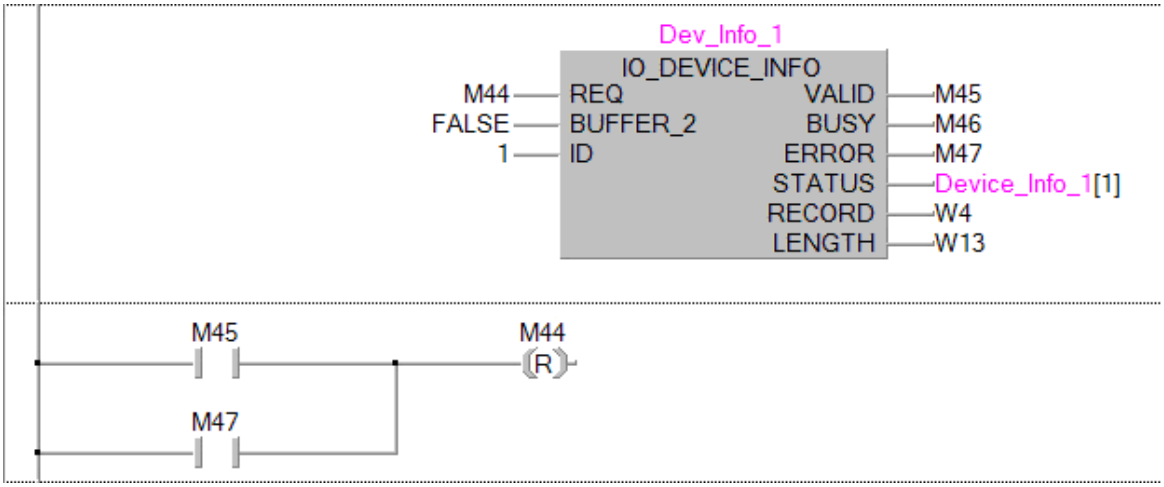


The input 'ID' contains the IO-device number '1'. By setting M44 the alarm request is started. M45 indicates that the requested data has been written to the global variable 'Device_Info_1'.

## 8.2 Global Variables

The exported PLC code contains several global variables for addressing the interface of the PROFINET Controller. There are two types of variables:

1. project-independent variables with fixed names and structures related to the PROFINET management and acyclic communication buffers in the PROFINET Controller

2. project-specific variables with editable names and structures related to the cyclic communication data of I/O devices and their modules

The following table lists the global variables and the respective 'Data Unit Types' (DUTs), of which the structure is independent of the IO devices in the network.

| Identifier | Type | Contents |
|---|---|---|
| vPN_MGMT_OUTPUTS | tPN_MGMT_OUTPUTS:<br>STRUCT<br>IOC_START_STOP: BOOL;<br>IOD_MGT_MODE: ARRAY [0..127] OF BOOL;<br>IOD_START_STOP_DEV: ARRAY [0..127] OF BOOL;<br>IOD_CMD_HSK_Y: ARRAY [0..127] OF BOOL;<br>IOD_MGT_ALARM: ARRAY [0..127] OF BOOL;<br>IOD_CONSIST: ARRAY [0..127] OF BOOL;<br>IOD_INPUT_HSK_Y: ARRAY [0..127] OF BOOL;<br>IOD_OUTPUT_HSK_Y: ARRAY [0..127] | Outputs to control the PROFINET Controller (request bits etc.) |

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| | | |
|---|---|---|
| | OF BOOL;<br>ACYC_HSK_Y_REQ1_EXECUTE: BOOL;<br>ACYC_HSK_Y_REQ2_EXECUTE: BOOL;<br>END_STRUCT; | |
| vPN_ACYCLIC_REQ1<br>vPN_ACYCLIC_REQ2 | tPN_ACYCLIC_REQ:<br>STRUCT<br>RequestID: DWORD;<br>ServiceID: WORD;<br>Status: WORD;<br>DeviceID: DWORD;<br>API: DWORD;<br>SlotNumber: WORD;<br>SubslotNumber: WORD;<br>Index: WORD;<br>DataLength: INT;<br>PNDeviceID: WORD;<br>PNVendorID: WORD;<br>ARUUID: ARRAY [0..7] OF WORD;<br>Reserve: ARRAY [0..7] OF WORD;<br>Data: ARRAY [0..719] OF WORD;<br>END_STRUCT; | Request buffer for acyclic communication<br>Note: this buffer does not contain I/O data. The I/O data is included in the DUTs/GVs specific to the configured I/O-devices |
| vPN_CYCLIC_OUTPUTS | tPN_CYCLIC_OUTPUTS:<br>STRUCT<br>LIVE_WORD_Y: WORD;<br>END_STRUCT; | Watchdog request for cyclic communication |
| vPN_MGMT_INPUTS | tPN_MGMT_INPUTS:<br>STRUCT<br>IOC_STS_CONFIG_OK: BOOL;<br>IOC_STS_CONFIG_DOWNLOADING: BOOL;<br>IOC_STS_KEYFILE_ERROR: BOOL;<br>IOC_STS_STARTED: BOOL;<br>IOC_STS_ERROR_DIAG_SET: BOOL;<br>IOC_STS_PLC_WD_ERR: BOOL;<br>IOD_CMD_HSK_X: ARRAY [0..127] OF BOOL;<br>IOD_INPUT_HSK_X: ARRAY [0..127] OF | Inputs from the PROFINET Controller (handshake, status etc.) |

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| | | |
|---|---|---|
| | BOOL;<br>IOD_OUTPUT_HSK_X: ARRAY [0..127] OF BOOL;<br>ACYC_HSK_Y_RES1_COMPLETED: BOOL;<br>ACYC_HSK_Y_RES2_COMPLETED: BOOL;<br>ACYC_HSK_Y_RES1_ACCEPTED: BOOL;<br>ACYC_HSK_Y_RES2_ACCEPTED: BOOL;<br>IOD_ALARM_IND: ARRAY [0..127] OF BOOL;<br>IOD_CONN_STS: ARRAY [0..127] OF BOOL;<br>IOD_ERR_STS: ARRAY [0..127] OF BOOL;<br>END_STRUCT; | |
| vPN_ACYCLIC_RES1<br>vPN_ACYCLIC_RES2 | tPN_ACYCLIC_RES:<br>STRUCT<br>RequestID: DWORD;<br>ServiceID: WORD;<br>Status: WORD;<br>DeviceID: DWORD;<br>DataLength: INT;<br>ErrorDecode: WORD;<br>ErrorCode1: WORD;<br>ErrorCode2: WORD;<br>Reserve: ARRAY [0..9] OF WORD;<br>Data: ARRAY [0..729] OF WORD;<br>END_STRUCT; | Response buffer for acyclic communication<br>Note: this buffer does not contain I/O data. The I/O data is included in the DUTs/GVs specific to the configured I/O-devices |
| vPN_ACYCLIC_DIAG_INPUTS | tPN_ACYCLIC_DIAG_INPUTS:<br>STRUCT<br>ADV_DIAG_ERR_CODE: WORD;<br>ADV_DIAG_ERR_CODE2: WORD;<br>ADV_DIAG_ADD_INFO: ARRAY [0..17] OF WORD;<br>CNF_CRC: ARRAY [0..1] OF WORD;<br>IOD_ADV_STS: ARRAY [0..63] OF WORD; | Extended diagnostic information |

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| | | |
|---|---|---|
| | END_STRUCT; | |
| vPN_CYCLIC_INPUTS | tPN_CYCLIC_INPUTS:<br>STRUCT<br>LIVE_WORD_X: WORD;<br>END_STRUCT; | Watchdog response for cyclic communication |
| vPN_DEVICE_DETECT_DATA<br><br>This is the default type specified in the exported PLC code. User can change the type to the extended version (see below). | tPN_DEVICE_DETECT_DATA:<br>STRUCT<br>VendorID: WORD:=0;<br>DeviceID: WORD:=0;<br>IP_Address: DWORD:=0;<br>Subnetmask: DWORD:=0;<br>Gateway: DWORD:=0;<br>MAC_Address_Bytes1_2: WORD;<br>MAC_Address_Bytes3_4: WORD;<br>MAC_Address_Bytes5_6: WORD;<br>END_STRUCT; | Basic type information of the connected IO devices |
| vPN_DEVICE_DETECT_DATA<br><br>This type must be specified for this global variable by the user, if the user sets the 'EXTENDED' input of the function block 'Net_Detect' to 1. | tPN_DEVICE_DETECT_DATA:<br>STRUCT<br>VendorID: WORD:=0;<br>DeviceID: WORD:=0;<br>IP_Address: DWORD:=0;<br>Subnetmask: DWORD:=0;<br>Gateway: DWORD:=0;<br>MAC_Address_Bytes1_2: WORD;<br>MAC_Address_Bytes3_4: WORD;<br>MAC_Address_Bytes5_6: WORD;<br>**Data: ARRAY [0..134] OF WORD;**<br>END_STRUCT; | Extended type information of the connected IO devices<br><br>This type consists of the structure 'tPN_DEVICE_DETECT_DATA' with an additional word array element to store additional device information. |

The global variables are assigned to device addresses in the buffers, which the user has entered in the 'PLC Settings' dialog.

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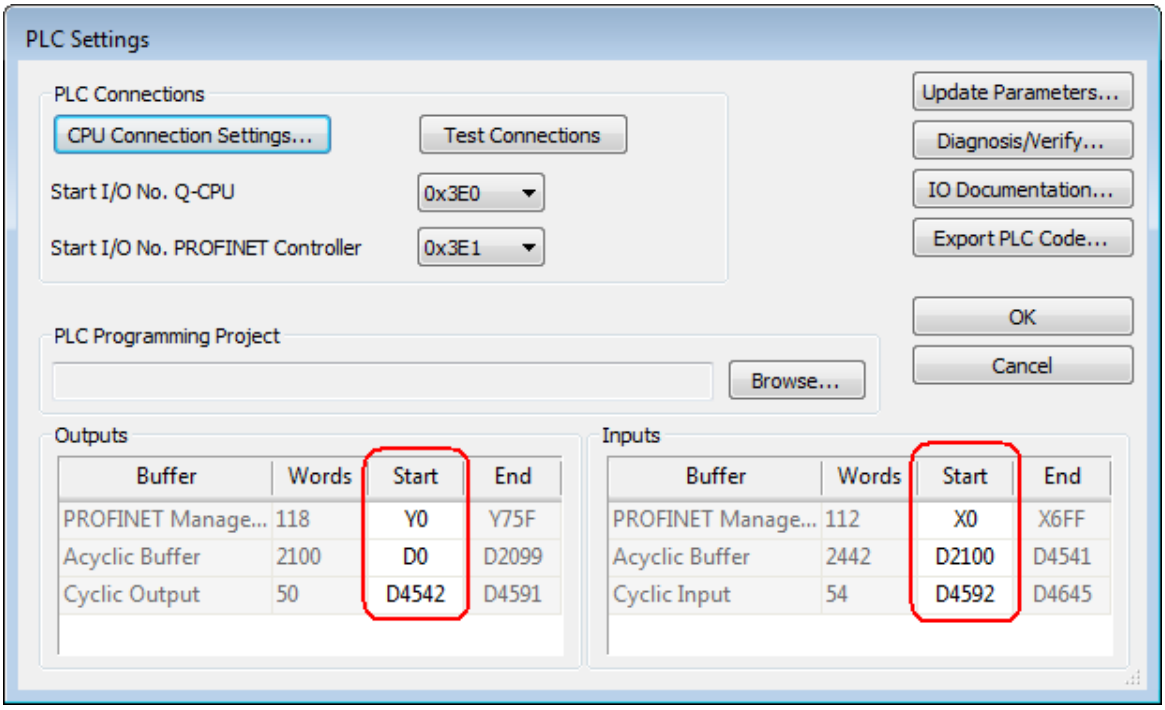
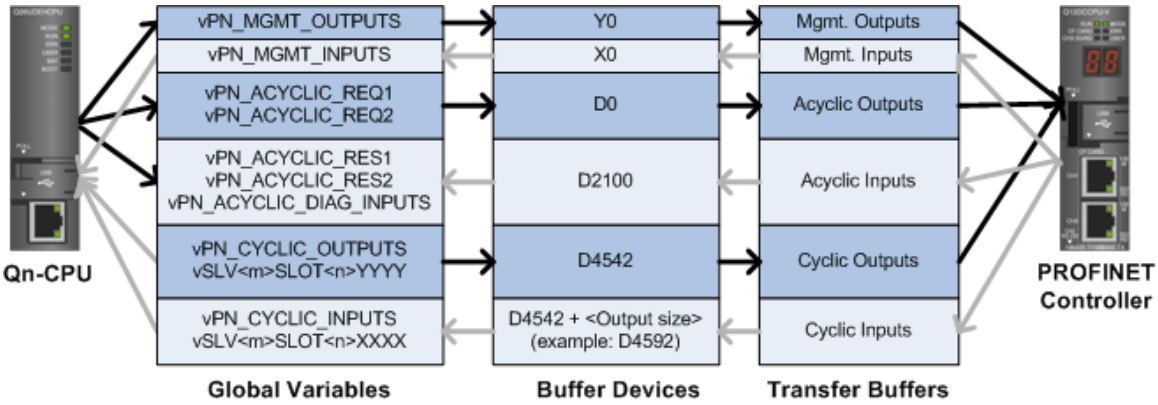



The automatic refresh executed by the Qn-CPU automatically copies the output contents from the buffer devices to the transfer buffers in shared memory and the input contents in the opposite direction. The global variables reference these buffer devices. Thus a read/write access by the PLC program to a global variable equals a read/write access to the respective buffer device.

The following diagram shows the relation between transfer buffers, devices and global variables.




With the default buffer device addresses as shown in the previous screenshot the export PLC code contains the following global variable definitions:

| Identifier | Type |
|---|---|
| vPN_MGMT_OUTPUTS | Name \| Type \| MIT-Addr. \| IEC-Addr.<br>IOC_START_STOP \| BOOL \| Y0 \| %QX0<br>IOD_MGT_MODE \| ARRAY [0..127] OF BOOL \| Y10 \| %QX16<br>IOD_START_STOP_DEV \| ARRAY [0..127] OF BOOL \| Y90 \| %QX144<br>IOD_CMD_HSK_Y \| ARRAY [0..127] OF BOOL \| Y110 \| %QX272<br>IOD_MGT_ALARM \| ARRAY [0..127] OF BOOL \| Y190 \| %QX400<br>IOD_CONSIST \| ARRAY [0..127] OF BOOL \| Y210 \| %QX528<br>IOD_INPUT_HSK_Y \| ARRAY [0..127] OF BOOL \| Y290 \| %QX656<br>IOD_OUTPUT_HSK_Y \| ARRAY [0..127] OF BOOL \| Y310 \| %QX784<br>ACYC_HSK_Y_REQ1_EXE( \| BOOL \| Y390 \| %QX912<br>ACYC_HSK_Y_REQ2_EXE( \| BOOL \| Y391 \| %QX913 |

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vPN_ACYCLIC_REQ1

| Name | Type | MIT-Addr. | IEC-Addr. |
|---|---|---|---|
| RequestID | DWORD | D0 | %MW0.0 |
| ServiceID | WORD | D2 | %MW0.2 |
| Status | WORD | D3 | %MW0.3 |
| DeviceID | DWORD | D4 | %MW0.4 |
| API | DWORD | D6 | %MW0.6 |
| SlotNumber | WORD | D8 | %MW0.8 |
| SubslotNumber | WORD | D9 | %MW0.9 |
| Index | WORD | D10 | %MW0.10 |
| DataLength | INT | D11 | %MW0.11 |
| PNDeviceID | WORD | D12 | %MW0.12 |
| PNVendorID | WORD | D13 | %MW0.13 |
| ARUUID | ARRAY [0..7] OF WORD | D14 | %MW0.14 |

vPN_ACYCLIC_REQ2

| Name | Type | MIT-Addr. | IEC-Addr. |
|---|---|---|---|
| RequestID | DWORD | D750 | %MW0.750 |
| ServiceID | WORD | D752 | %MW0.752 |
| Status | WORD | D753 | %MW0.753 |
| DeviceID | DWORD | D754 | %MW0.754 |
| API | DWORD | D756 | %MW0.756 |
| SlotNumber | WORD | D758 | %MW0.758 |
| SubslotNumber | WORD | D759 | %MW0.759 |
| Index | WORD | D760 | %MW0.760 |
| DataLength | INT | D761 | %MW0.761 |
| PNDeviceID | WORD | D762 | %MW0.762 |
| PNVendorID | WORD | D763 | %MW0.763 |
| ARUUID | ARRAY [0..7] OF WORD | D764 | %MW0.764 |

vPN_CYCLIC_OUTPUTS

| Name | Type | MIT-Addr. | IEC-Addr. |
|---|---|---|---|
| LIVE_WORD_Y | WORD | D4542 | %MW0.4542 |

vPN_MGMT_INPUTS

| Name | Type | MIT-Addr. | IEC-Addr. |
|---|---|---|---|
| IOC_STS_CONFIG_OK | BOOL | X0 | %IX0 |
| IOC_STS_CONFIG_DOWNLOADING | BOOL | X1 | %IX1 |
| IOC_STS_KEYFILE_ERROR | BOOL | X2 | %IX2 |
| IOC_STS_STARTED | BOOL | X3 | %IX3 |
| IOC_STS_ERROR_DIAG_SET | BOOL | X10 | %IX16 |
| IOC_STS_PLC_WD_ERR | BOOL | X11 | %IX17 |
| IOD_CMD_HSK_X | ARRAY [0..127] OF BOOL | X20 | %IX32 |
| IOD_INPUT_HSK_X | ARRAY [0..127] OF BOOL | XA0 | %IX160 |
| IOD_OUTPUT_HSK_X | ARRAY [0..127] OF BOOL | X120 | %IX288 |
| ACYC_HSK_X_RES1_COMPLETED | BOOL | X1A0 | %IX416 |
| ACYC_HSK_X_RES2_COMPLETED | BOOL | X1A1 | %IX417 |
| ACYC_HSK_X_RES1_ACCEPTED | BOOL | X1A8 | %IX424 |

vPN_ACYCLIC_RES1

| Name | Type | MIT-Addr. | IEC-Addr. |
|---|---|---|---|
| RequestID | DWORD | D2100 | %MW0.2100 |
| ServiceID | WORD | D2102 | %MW0.2102 |
| Status | WORD | D2103 | %MW0.2103 |
| DeviceID | DWORD | D2104 | %MW0.2104 |
| DataLength | INT | D2106 | %MW0.2106 |
| ErrorDecode | WORD | D2107 | %MW0.2107 |
| ErrorCode1 | WORD | D2108 | %MW0.2108 |
| ErrorCode2 | WORD | D2109 | %MW0.2109 |
| Reserve | ARRAY [0..9] OF WORD | D2110 | %MW0.2110 |
| Data | ARRAY [0..729] OF WORD | D2120 | %MW0.2120 |

vPN_ACYCLIC_RES2

| Name | Type | MIT-Addr. | IEC-Addr. |
|---|---|---|---|
| RequestID | DWORD | D2850 | %MW0.2850 |
| ServiceID | WORD | D2852 | %MW0.2852 |
| Status | WORD | D2853 | %MW0.2853 |
| DeviceID | DWORD | D2854 | %MW0.2854 |
| DataLength | INT | D2856 | %MW0.2856 |
| ErrorDecode | WORD | D2857 | %MW0.2857 |
| ErrorCode1 | WORD | D2858 | %MW0.2858 |
| ErrorCode2 | WORD | D2859 | %MW0.2859 |
| Reserve | ARRAY [0..9] OF WORD | D2860 | %MW0.2860 |
| Data | ARRAY [0..729] OF WORD | D2870 | %MW0.2870 |

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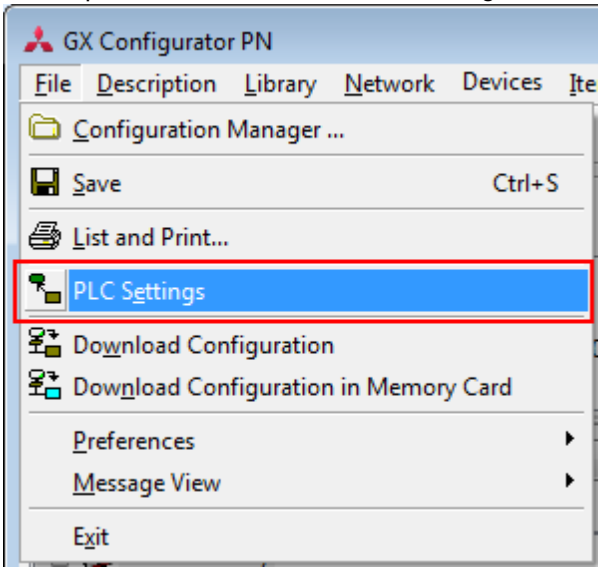
| | |
|---|---|
| vPN_ACYCLIC_DIAG_INPUTS | Name / Type / MIT-Addr. / IEC-Addr.<br>ADV_DIAG_ERR_CODE / WORD / D3600 / %MW0.3600<br>ADV_DIAG_ERR_CODE2 / WORD / D3601 / %MW0.3601<br>ADV_DIAG_ADD_INFO / ARRAY [0..17] OF WORD / D3602 / %MW0.3602<br>CNF_CRC / ARRAY [0..1] OF WORD / D3876 / %MW0.3876<br>IOD_ADV_STS / ARRAY [0..63] OF WORD / D3878 / %MW0.3878 |
| vPN_CYCLIC_INPUTS | Name / Type / MIT-Addr. / IEC-Addr.<br>LIVE_WORD_X / WORD / D4592 / %MW0.4592 |

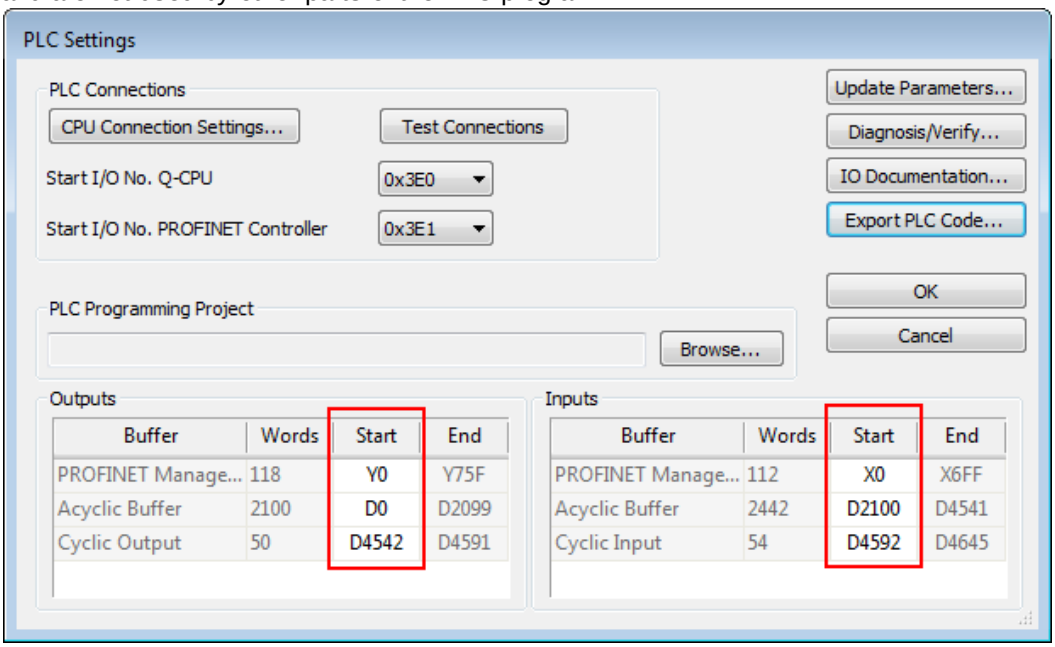
## 8.3 Integrating in PLC Project

The integration of the PROFINET network into the PLC application program requires several steps, which are here demonstrated using 'GX IEC Developer' (GID).

1. Complete the PROFINET network configuration and open the 'PLC Settings' dialog.




2. Assign device addresses to the input and output buffers. Make sure that the buffers do not overlap and are not used by other parts of the PLC program.

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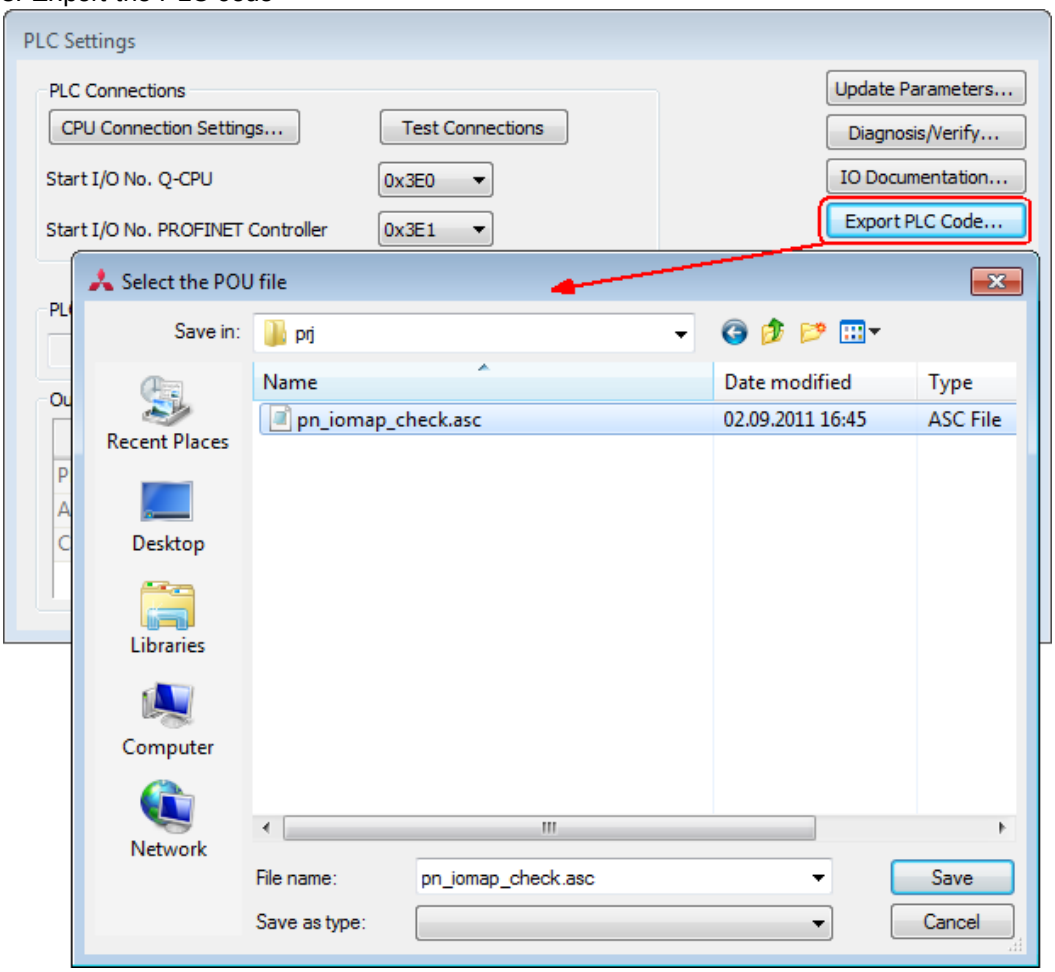
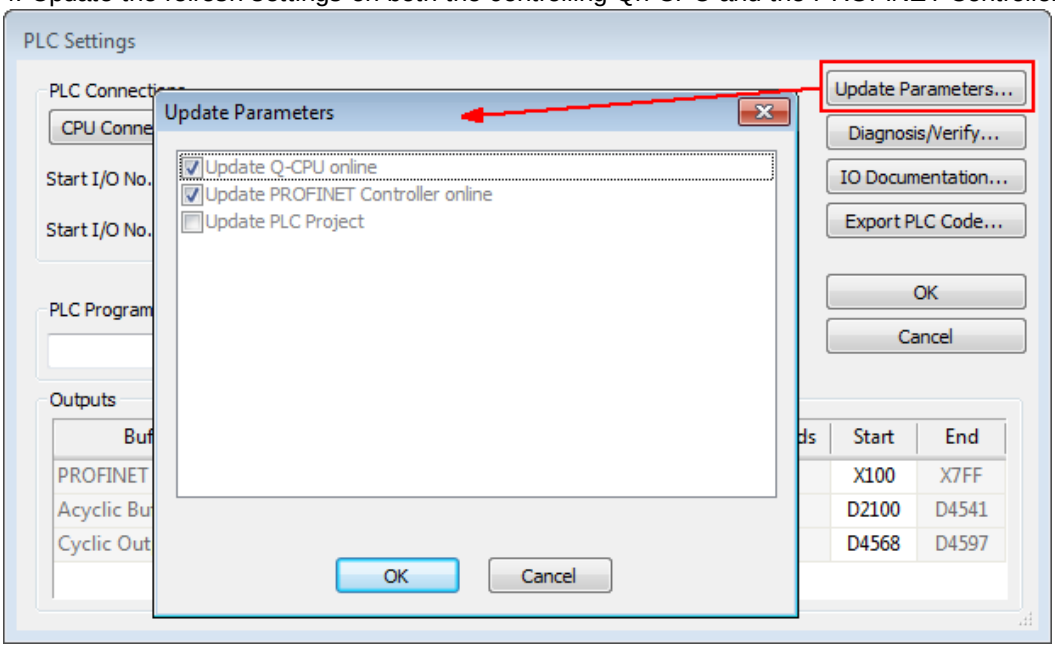
3. Export the PLC code




4. Update the refresh settings on both the controlling Qn-CPU and the PROFINET Controller.




5. Download the PROFINET Controller configuration

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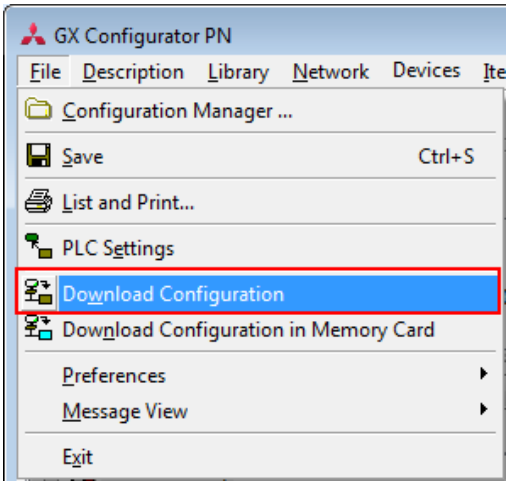
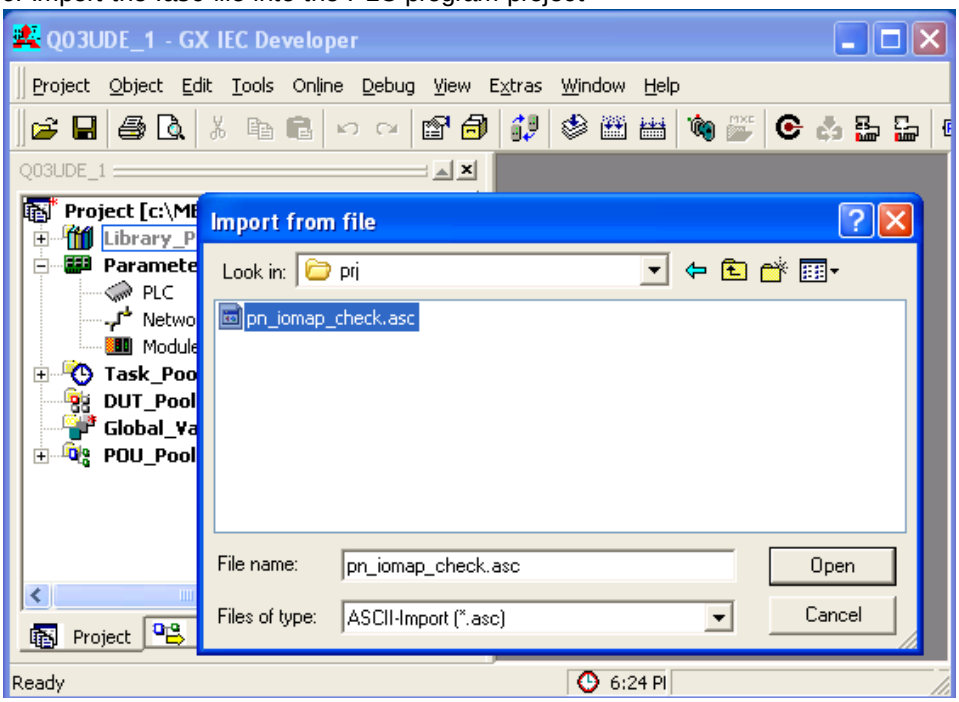



6. Import the .asc-file into the PLC program project




7. The user libraries are automatically added to the library pool of the PLC project, when the user imports the .asc-file.

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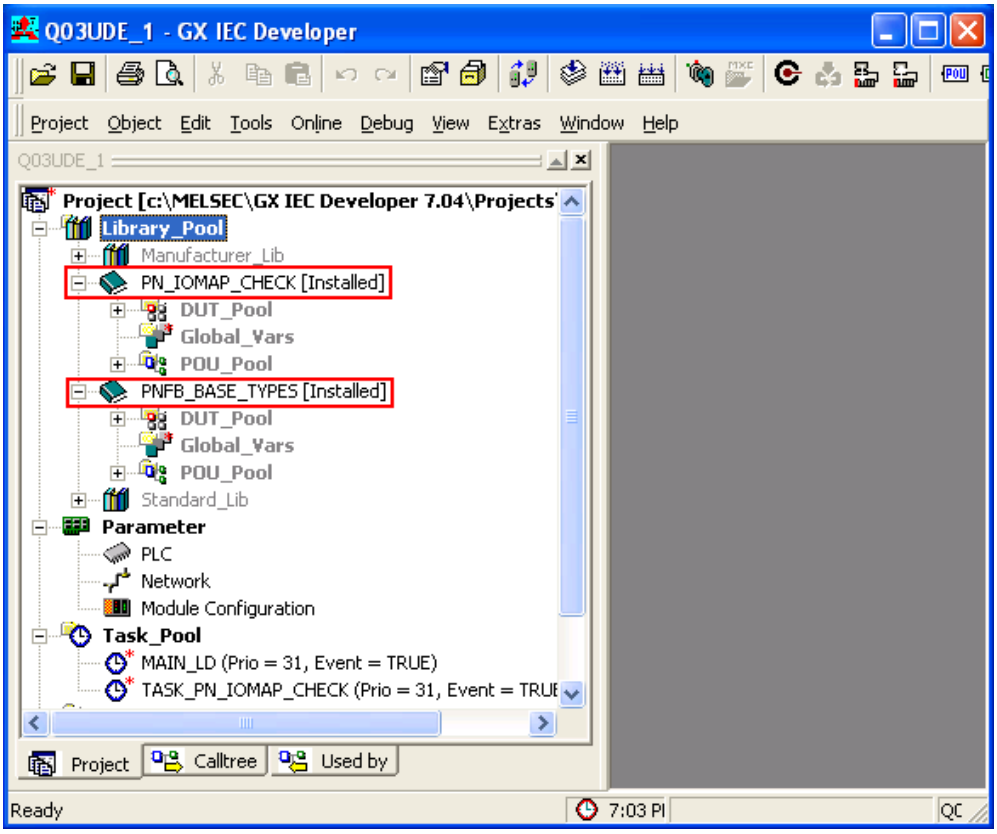
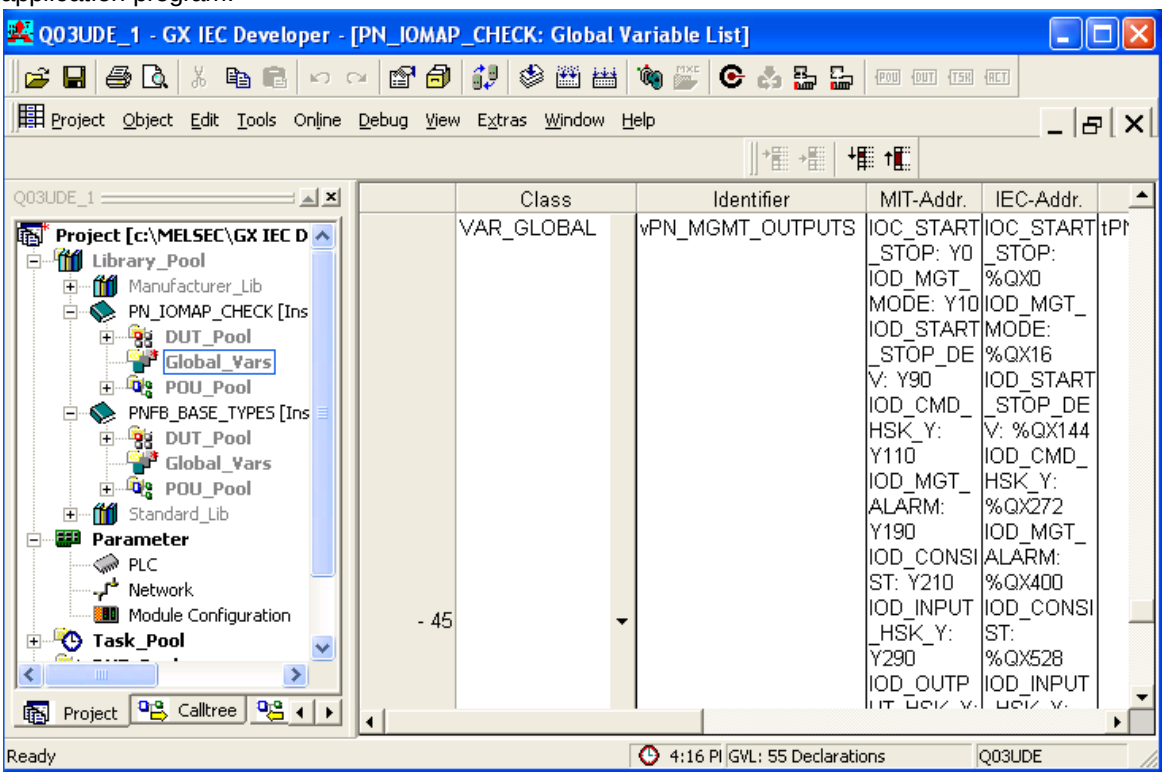



8. The global variables included in the project-specific user library can now be included in the application program.



# 9 Appendix

## 9.1 Troubleshooting

### 9.1.1 Factory Default Settings

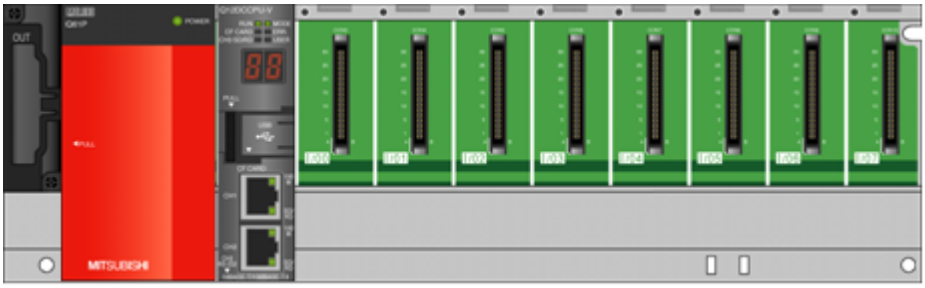
#### Problem

The ME1PN1FW-Q cannot be accessed from GX Configurator-PN, although network address settings and cabling are correct.

#### Solution

To reset the ME1PN1FW-Q to its factory default settings execute the following operations.

**Important:** the ME1PN1FW-Q must be placed alone in the first slot (marked 'CPU') of the PLC backplane and the CF card must be removed from its card reader slot! ).



**Note**: the position of the LEDs and the switches is indicated in the section 'PROFINET Controller ME1PN1FW-Q'.

1. set the MODE/STOP/RUN switch on the front to the MODE position

2. reset the module by setting the RESET/SELECT switch to the RESET position and then back to the middle position or power-cycle the CPU

3. confirm that the mode LED shows an **orange** light and the 7-segment LED displays '**00**'

4. set the MODE/STOP/RUN switch to the STOP position

5. set the RESET/SELECT switch to the SELECT position multiple times, until the 7-segment display displays '**11**'

6. set the MODE/STOP/RUN switch to the RUN position

7. confirm that the **green** RUN LED is flashing first and then turns off with the 7-segment LED displaying '**00**'

8. set the MODE/STOP/RUN switch to the STOP position

9. reset the module by setting the RESET/SELECT switch to the RESET position and then back to the middle position

10. confirm that the MODE LED shows a steady **green** light and both RUN and USER LEDs show a flashing **green** light

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11. confirm that after a while both RUN and USER LEDs turn off and the MODE LED flashes **green**

**Note**: for the following steps the controlling Qn-CPU can be inserted into the PLC rack and the PROFINET Controller module can be moved to the slot next to it, after power has been turned off.

Activate the PROFINET functionality on the ME1PN1FW-Q with these operations

1. insert the CF card with the PROFINET I/O software and reset the module.

2. wait, until the 7-segment LED shows '**AA**'

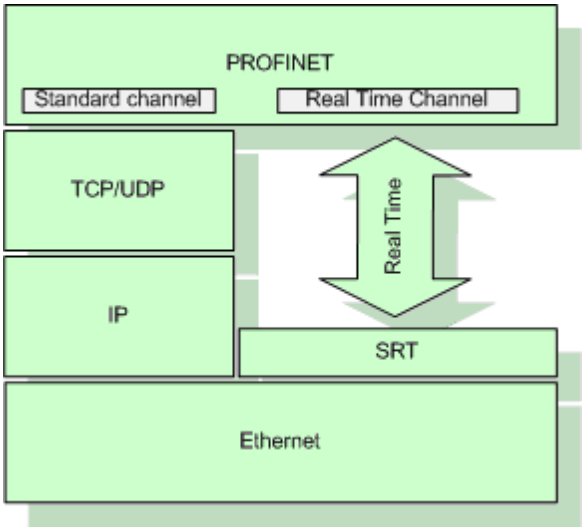
3. start GX Configurator-PN and download the configuration (this includes setting the IP address from the default setting 192.168.3.3 to the address assigned in the GX Configurator-PN project)

## 9.2 Introduction to PROFINET IO

PROFINET is an industrial communications protocol based on Ethernet which was created by PROFIBUS International. Depending on the tasks to be carried out, PROFINET uses different communication layers of the OSI model:

- ✓ Layer 4 (transport): "TCP/UDP" for all configuration exchanges.
- ✓ Layer 2 (Link): "Ethernet" for process data exchanges such as inputs/outputs and alarms.

The network controller is called the IO-Controller (Master) and the Devices called IO-Device (Slave). With PROFINET, different network topologies may be realized. The most common are the star and the bus.




### Protocols Used by PROFINET
### Discovery and basic Configuration Protocol (DCP)

This protocol is based on Ethernet (level 2). Amongst other things it enables the presence of an IO-Device to be detected on the network and its IP configuration to be read or written. This protocol will be mainly used in two phases:

- Network configuration: assignment of names and IP addresses to the IO-Devices.
- Establishing a connection: detection of the presence of the IO-Device and the control/adaptation of its IP address

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### Remote Procedure Call (RPC)

This protocol is based on TCP/UDP. It is used to execute the connection phase to an IO-Device together with all data block read/write accesses.

### Real Time Acyclic (RTA)

This protocol is based on Ethernet (level 2). This protocol is used to exchange alarms between the IO-Device and the IO-Controller.

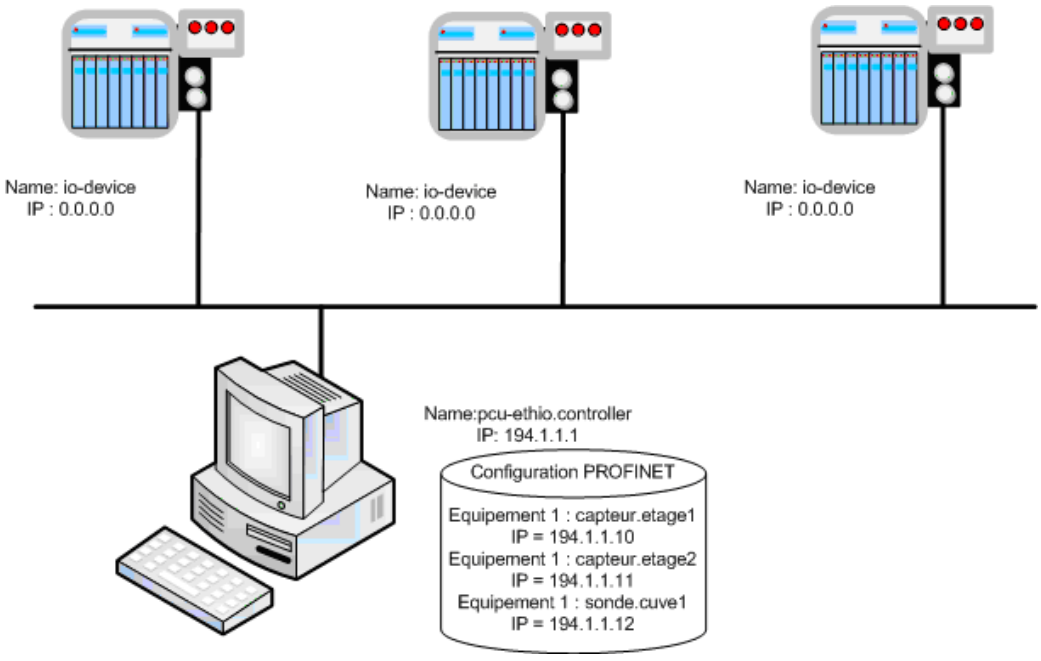
### Real Time Cyclic (RTC)

This protocol is based on Ethernet (level 2). This protocol is used to exchange cyclic input/output data.

## Addressing of PROFINET components on the Ethernet network

The DCP protocol is used to detect the presence of a PROFINET station on the network. DCP is a layer 2 protocol (Ethernet). For this reason it does not use IP addressing to find PROFINET components, but their PROFINET name. One of the features of the PROFINET protocol is that each PROFINET component must be named. This name is known as its PROFINET name (DCP Name). Then once the component has been identified on the network, DCP gives the option of assigning the IP configuration of the IO-Device. This addressing is mandatory as PROFINET uses TCP/UDP and IP layers.
When a PROFINET network is installed, the first thing to do is to name all the IO-Devices present on the network uniquely. This task can be carried out using the 'Online Action Tool' in GX Configurator-PN.

A newly-wired PROFINET network:




Note that at startup, each IO-Device has the same name and same IP address.

A PROFINET network with IO-Devices named correctly from the engineering tool:

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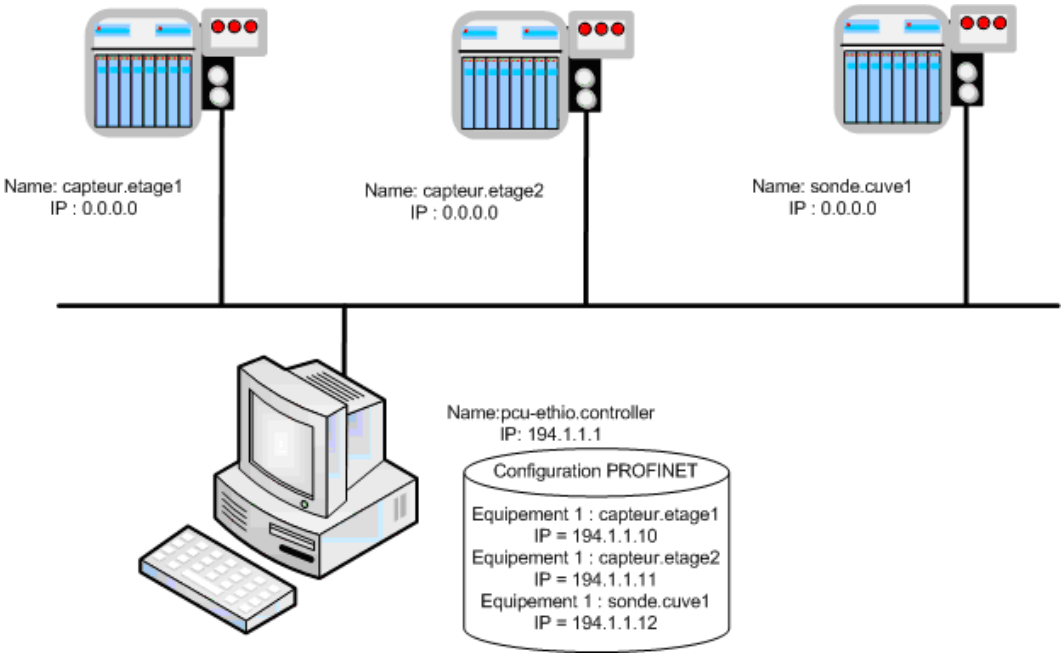
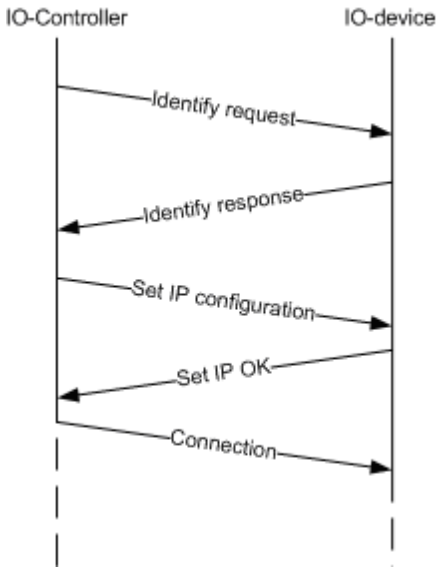



Note that all the IO-Devices present have a unique name (sensor.stage1, sensor.stage2 and probe.tank1). However, the IP addresses of these IO-Devices remain set to 0.0.0.0.

During a connection phase, the IO-Controller starts by searching for an IO-Device using a multicast request commonly called "identify". When the IO-Device replies, the IO-Controller checks if the IP parameters of the IO-Device are definitely those configured. If not, then the IP-Controller assigns the correct IP configuration to the IO-Device. Once this sequence has been completed, the IO-Controller will be able to establish a connection with the IO-Device.




A PROFINET network with IO-Devices connected to an IO-Controller:

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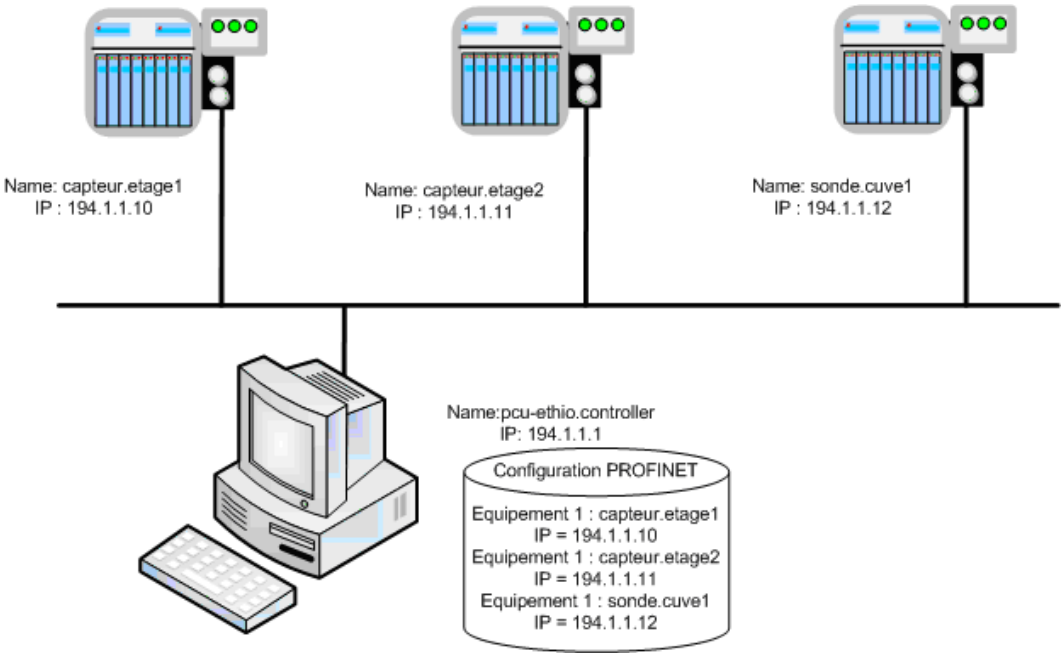
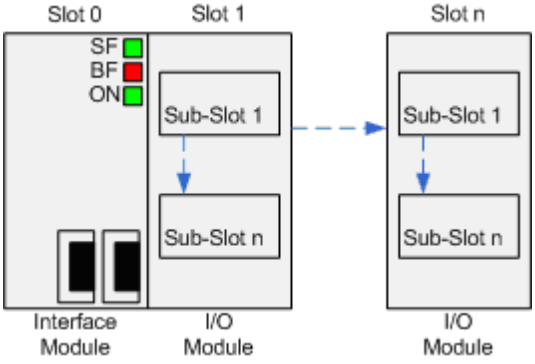



During the connection, the IO-Controller assigns the IP address to each of the IO-Devices.
After this, the PROFINET network is correctly configured. IP address conflicts have been avoided.
The whole of this sequence is made possible by the DCP protocol.

## Architecture of an IO-Device

The PROFINET IO input/output devices obey a uniform device model. This model allows compact field devices to be configured as modules.




A PROFINET IO input/output device is made up of slots, themselves made up of sub-slots. The input/output data is situated at sub-slot level. This organization may reflect a real or virtual situation.
In addition to the input/output modules, each IO-Device contains at least one DAP (Device Access Point). To establish a connection, the IO-Controller connects to the DAP. The standard defines the DAP as an input module like any other. However, the DAP is often a module found on slot 0 of the IO-Device with an output size equal to 0.
A PROFINET IO-Device is configured by means of a GSD file. This file, in XML format, concentrates all the features and essential data in one place:

- Properties of the device (transmission parameters, etc.)
- Number and size of compatible modules
- Configuration of each module
- Module parameters

The GSD files are provided by the manufacturer of your equipment.

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## Data Exchange (I/O)

The exchange of input/output data in PROFINET-IO is based on the producer/consumer model. This model is asynchronous. The IO-Controller produces outputs for the IO-Device and the IO-Controller consumes inputs from the IO-Device and vice versa.
The refresh period determines the production/consumption time. This time is defined for each IO-Device. In a complete configuration, the network cycle time is equivalent to the largest refresh period of the configuration.

Example

| IO-Device Name | Refresh Period |
|---|---|
| io-device1 | 8 ms |
| io-device2 | 32 ms |
| io-device3 | 16 ms |

In the case of configuration 1, the largest refresh period is 32 ms (io-device2). The network cycle time is 32 ms. This means that every 32 ms, all inputs/outputs will have been refreshed at least once.
The diagnostic model of PROFINET input/output exchanges defines, in addition to process data, IOxS (IOPS or IOCS) typed data:

IOPS - Input Output Object Provider Status

An IOPS is associated with the input/outputs from each slot/sub-slot. This status indicates the quality of the data produced from each slot/sub-slot to the consumer.
The possible values are:

- GOOD (0x80)
- BAD_BY_DEVICE (0x60)
- BAD_BY_CONTROLLER (0x40)
- BAD_BY_SUBSLOT (0x00)

IOCS - Input Output Object Consumer Status

An IOCS is associated with the input/outputs from each slot/sub-slot. This status indicates the quality of the data consumed at each slot/sub-slot to the producer.
The possible values are:

- GOOD (0x80)
- BAD_BY_DEVICE (0x60)
- BAD_BY_CONTROLLER (0x40)
- BAD_BY_SUBSLOT (0x00)

The representation of the inputs/outputs of an IO-Device in engineering tool includes the process data (I/O data) and the diagnostic data (IOPS and IOCS).
Example 1: The inputs/outputs of an IO-Device contains the process data (I/O data) and the diagnostic data (IOPS and IOCS)

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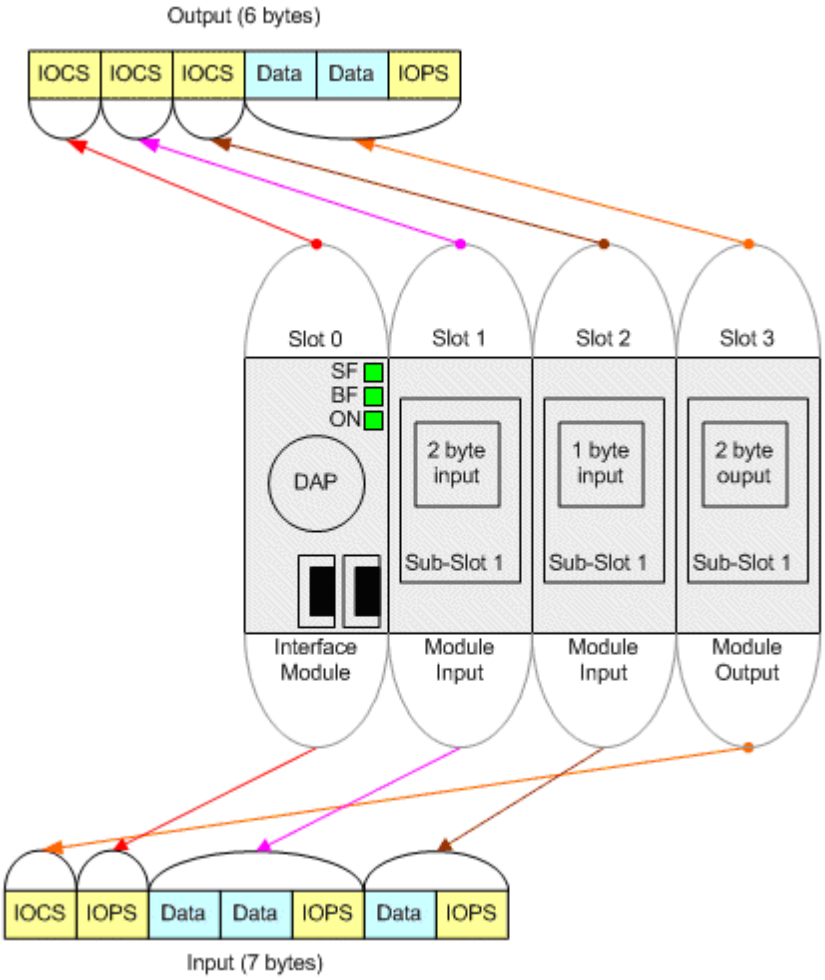


In the example above, the IO-Device is made up of:

- 1 2-byte input module
- 1 1-byte input module
- 1 2-byte output module

For the IO-Device taken in the example, with 2 process output bytes and 3 input bytes, the IO-Controller has to manage 7 input bytes and 6 output bytes.

| | Slot 0 | | | Slot 0 | | | Slot 0 | | | Slot 0 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IOPS | IOCS | data | IOPS | IOCS | data | IOPS | IOCS | data | IOPS | IOCS | data |
| **Output = 6 bytes** | | 1 | | | 1 | | | 1 | | 1 | | 2 |
| **Input = 7 bytes** | 1 | | 0 | 1 | | 2 | 1 | | 1 | | 1 | |

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# 9.3 Transfer Setup

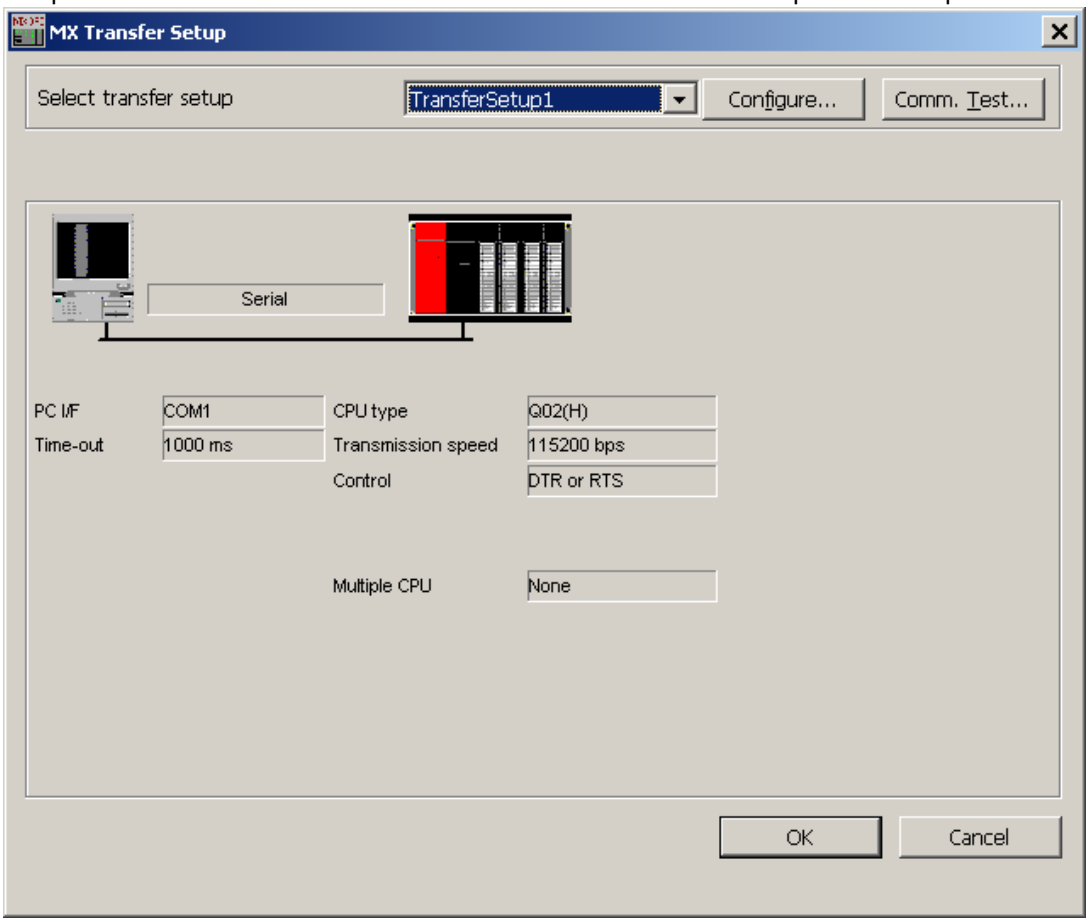
## 9.3.1 Configuring Transfer Setups

### Transfer Setup Selection

The main dialog of the transfer setup provides access to the configured transfer setups. The user can

- add new setups
- remove existing setups
- modify a setup
- select a setup to be used
- test the communication with a selected setup

The network architecture and settings are displayed with bitmaps representing the network nodes. The parameters associated with a node are listed underneath the respective bitmap.




| Name | Description | Choices / Setting range | Default |
|---|---|---|---|
| Select transfer setup | lists the names of existing transfer setups and the functions 'New' and 'Rename/Remove' | 1-32 characters | name of selected transfer setup |
| Configure | edit the selected transfer setup | - | - |

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| Name | Description | Choices / Setting range | Default |
|---|---|---|---|
| Comm. Test | test the connection to the PLC | - | - |

Pressing the **OK** button closes the dialog and uses the settings of the currently selected transfer setup to the device, for which the transfer setup has been opened. If the dialog is closed by pressing the 'Cancel' button, the transfer settings of the device remain unchanged.

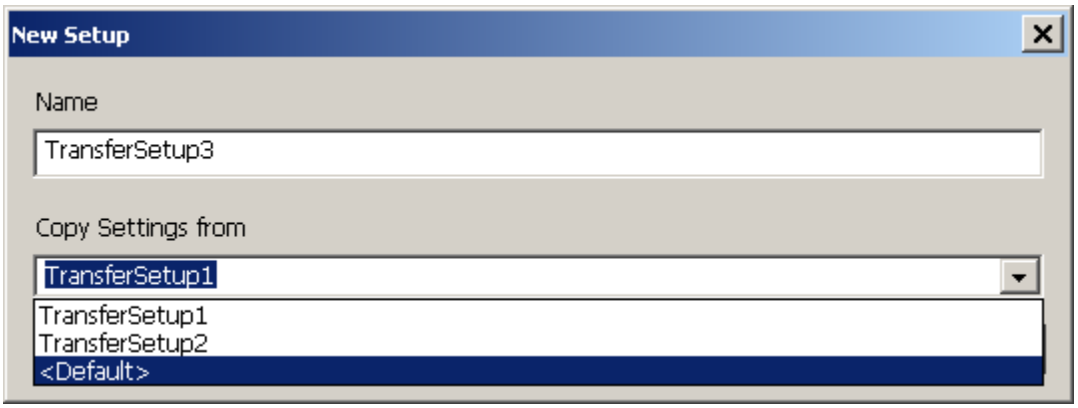
| | |
|---|---|
| | **Note:** please notice that devices using the same transfer setup name are not automatically updated. You need to select each device separately, open the transfer setup dialog and reassign the settings to the device. |

## New Transfer Setup

For defining a new transfer setup, the user selects the entry '<**New…**>' from the selection list.

If the maximum number of transfer setups (default is max. 32 setups) has been reached, a message is displayed.

In this case the user must either delete a setup or modify an existing one.
If there is sufficient space for a new transfer setup, a dialog prompts the user to enter the name of the new transfer setup.
The user can select an existing transfer setup, from which the settings are copied, or select <**Default**>.

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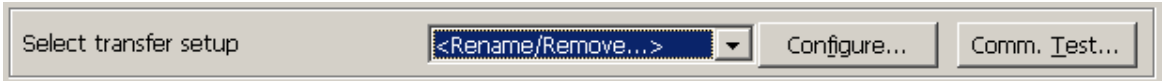
| Name | Description | Choices / Setting range | Default |
|---|---|---|---|
| Name | name of new transfer setup | 1-32 characters | TransferSetup<n> |
| Copy Settings from | uses the current settings of the selected setup for the new setup | - existing transfer setup names<br>- <Default> | selected setup |

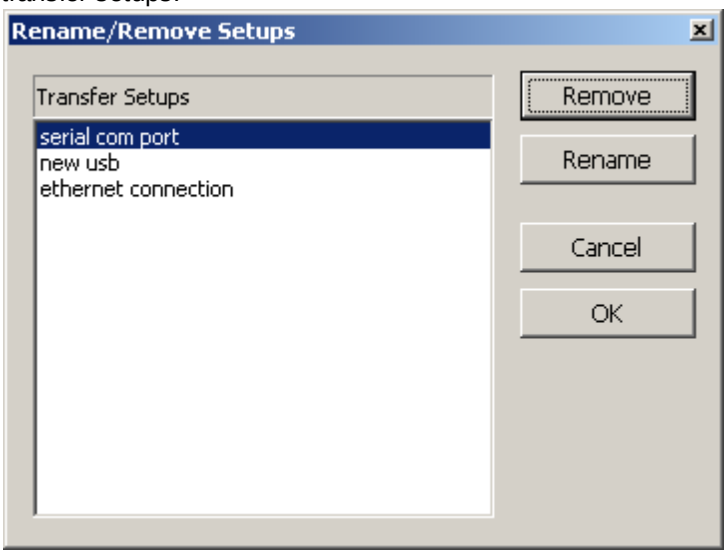
The name assigned to the transfer setup must meet the following restrictions
- must be unique
- must not be empty
- must not exceed 32 characters in length
- must not start or end with blanks (automatically removed)

## Rename / Remove Transfer Setup

The user can change the name of existing setups or remove them, if they are no longer used.




When the entry '<**Rename/Remove…**> is selected, a dialog is displayed, which lists the existing transfer setups.




Pressing the '**Remove**' button deletes the currently selected setup. Pressing the '**Rename**' button or double-clicking a setup name in the list opens an editor for the name within the list.

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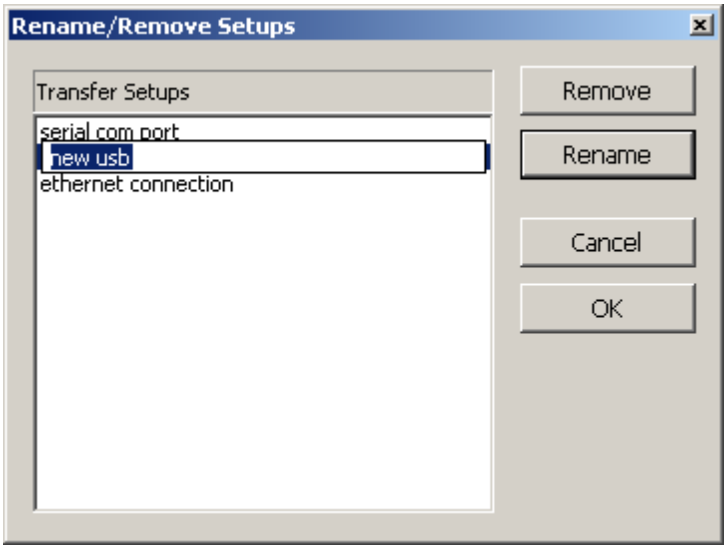


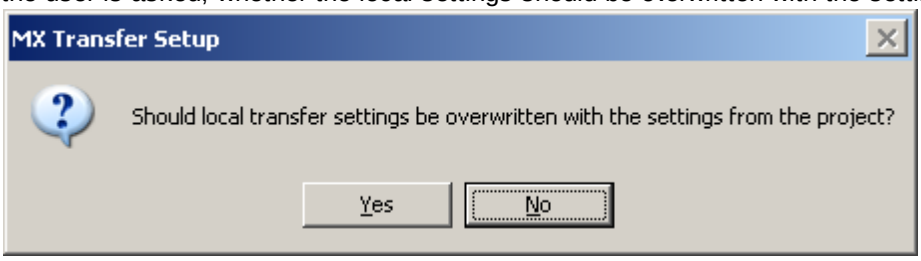

A setup name is rejected, if it does not meet the requirements for setup names.

## Editing an Existing Transfer Setup

Pressing the '**Configure**' button opens the transfer setup wizard for the selected transfer setup.

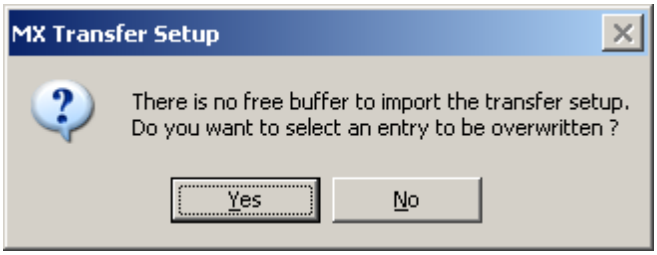
## Replace Transfer Setup Dialog

When the transfer setup dialog is opened, it imports the transfer setup of the currently selected device into the local transfer setup database. This database is kept in the Windows™ registry.
If the registry already contains a setup with the same name as the one of the selected device, the settings in the registry are compared with the settings used by the device. In case the settings differ, the user is asked, whether the local settings should be overwritten with the settings from the device.




Selecting '**Yes**' causes the transfer settings from the device to overwrite the settings currently kept in the registry under the given transfer setup name. Otherwise the settings of the transfer setup in the registry remain unchanged.

If no setup with the name exists, a new setup is added to the database. In case there is insufficient space for a new setup, the following message is displayed.


MX Transfer Setup
There is no free buffer to import the transfer setup.
Do you want to select an entry to be overwritten ?
Yes
No

If the user selects 'Yes', a list of existing setups is displayed. The user can select a setup in the list, which is overwritten with the new settings.

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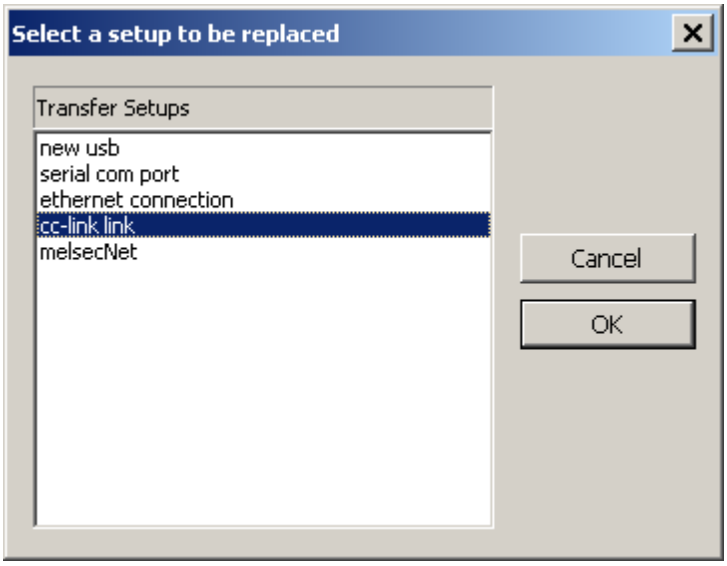
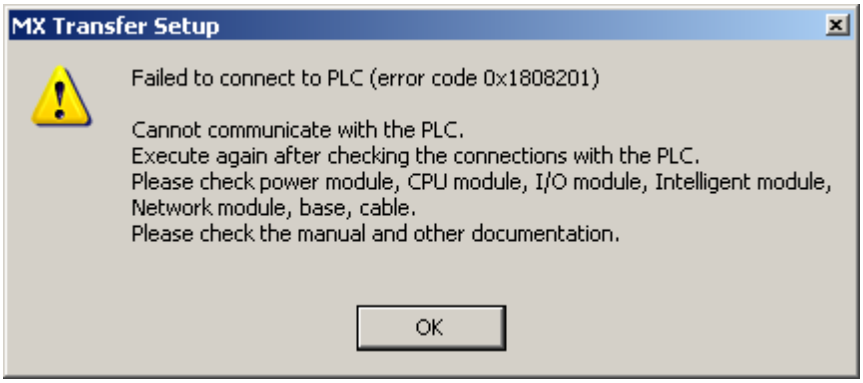



## Connection Test

The '**Comm. Test**' button uses the settings of the selected transfer setup to connect to the PLC. If the connection can be established, a success message is displayed.

If the connection to the PLC fails, the Easysocket error code is displayed, together with an explanatory message.


MX Transfer Setup
Failed to connect to PLC (error code 0x1808201)
Cannot communicate with the PLC.
Execute again after checking the connections with the PLC.
Please check power module, CPU module, I/O module, Intelligent module,
Network module, base, cable.
Please check the manual and other documentation.
OK

### 9.3.2 Transfer Setup Wizard

The transfer setup is used for the configuration of communication links from the PC to a PLC system.
The settings for a communication link between PC and PLC are entered in a set of dialogs. These are organized as a series of sequential pages. Moving between adjoining pages is done via the '**Back**' and '**Next**' buttons.

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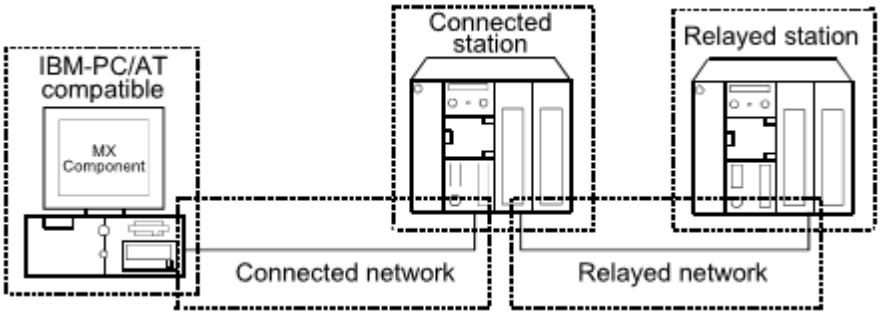
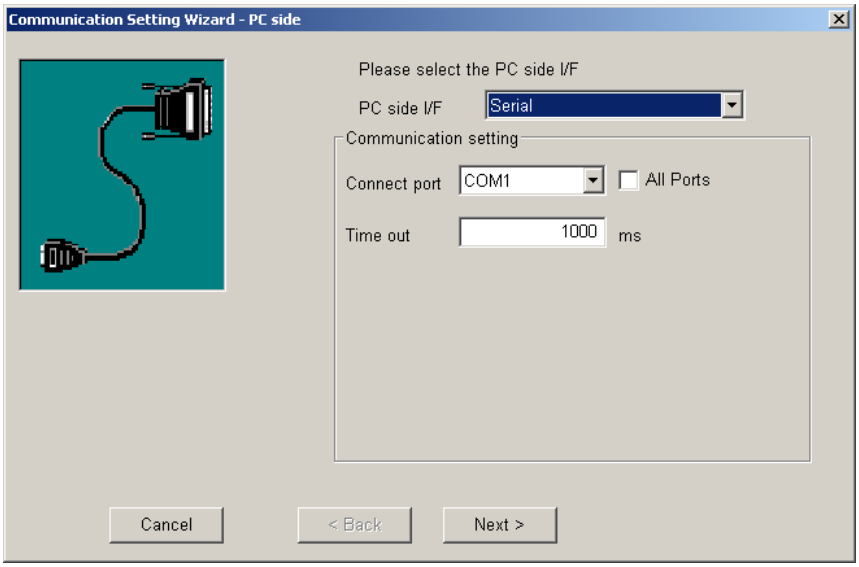



| Screen Name | Description |
|---|---|
| Wizard 1) | set the connected network between the IBM-PC/AT compatible and connected station (PLC CPU and module). |
| Wizard 2) | set the connected station (PLC CPU and module). |
| Wizard 3) | set the relayed network between the connected station (PLC CPU and module) and relayed station (PLC CPU and module). |
| Wizard 4) | set the relayed station PLC CPU. |
| Wizard 5) | add a comment |

Start the communication setting wizard.




The items shown in the 'Communication setting' box depend on the selected PC side interface. Choose the 'PC side I/F' to communicate with. The available interface types are listed below:

| 'PC side I/F' Selection | Communication Type |
|---|---|
| USB | USB communication |
| USB (via GOT) | USB communication via GOT |

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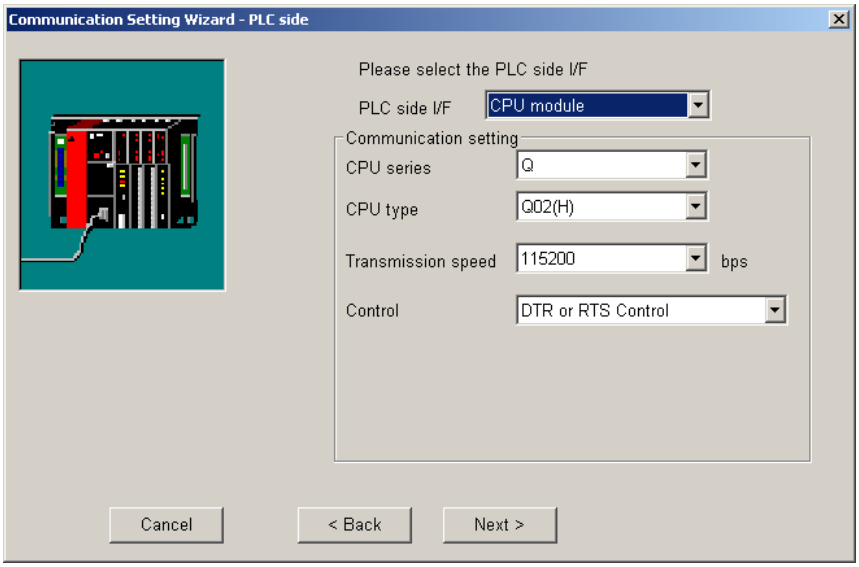
| 'PC side I/F' Selection | Communication Type |
|---|---|
| Serial | Computer link communication,<br>CPU COM communication, CC-Link G4 communication |
| Serial (via GOT) | Serial communication via GOT |
| Ethernet board | Ethernet communication |
| Ethernet board (via GOT) | Ethernet communication via GOT |
| Modem | Modem communication |
| CC-Link IE Control board | CC-Link IE communication |
| MELSECNET/H board | MELSECNET/H communication |
| MELSECNET/10 board | MELSECNET/10 communication |
| CC-Link IE Field board | CC-Link IE Field communication |
| CC-Link board | CC-Link communication |
| Q Series Bus | Q Series bus communication |
| GX Simulator | GX Simulator communication |
| GX Simulator2 | GX Simulator2 communication |
| CPU board | CPU board communication |

After setting the parameters continue by pressing the '**Next**' button.




The contents of the 'PLC side I/F' page depend on the selected PC side interface.

Set all available parameters and click the **Next** button.

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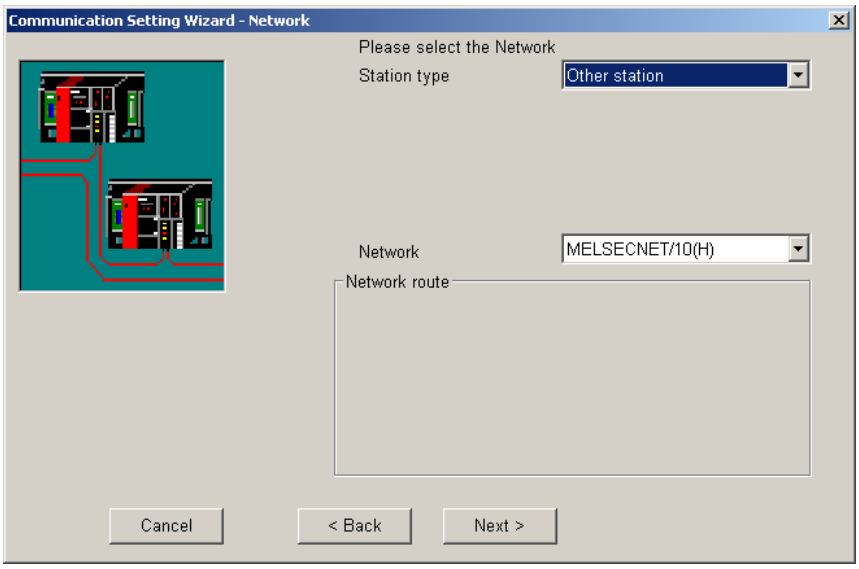
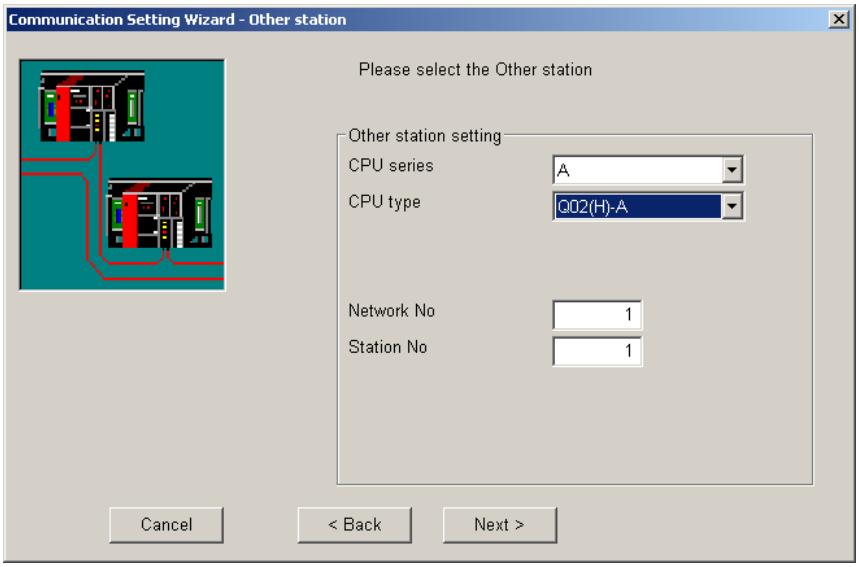



The contents of the 'Network' page depend on the selections in the previous pages.

Set all available parameters and click the **Next** button.

**Note**: when 'Modem' has been selected as 'PC side I/F', the line setting screen appears next. For details of the line setting screen refer to 'Modem Line Settings'.




The contents of the 'Other station' page depend on the selections in the previous pages.

Set all available setting items and click the **Next** button.

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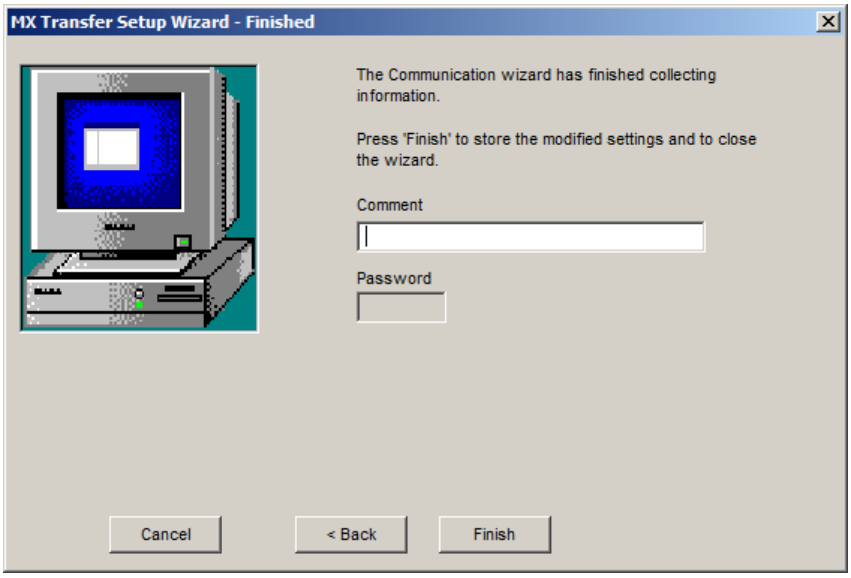


You can enter an optional comment of up to 32 characters for the connection.

Pressing the **Finish** button stores the current settings and closes the wizard.

| | |
|---|---|
| | **Note:**<br>The enclosed sample programs should serve as examples when writing the user program. They must be modified to match the specific application requirements. The use of code taken from the sample programs is done at the customer's own risk. |

#### 9.3.2.1 PC Universal Serial Bus (USB) Interface

Configure a connection from an USB port of the PC to a PLC.

## PC side USB parameters

| Parameter | Values | Description |
|---|---|---|
| Time out | 1 - 2147483647 | communication timeout in milliseconds |

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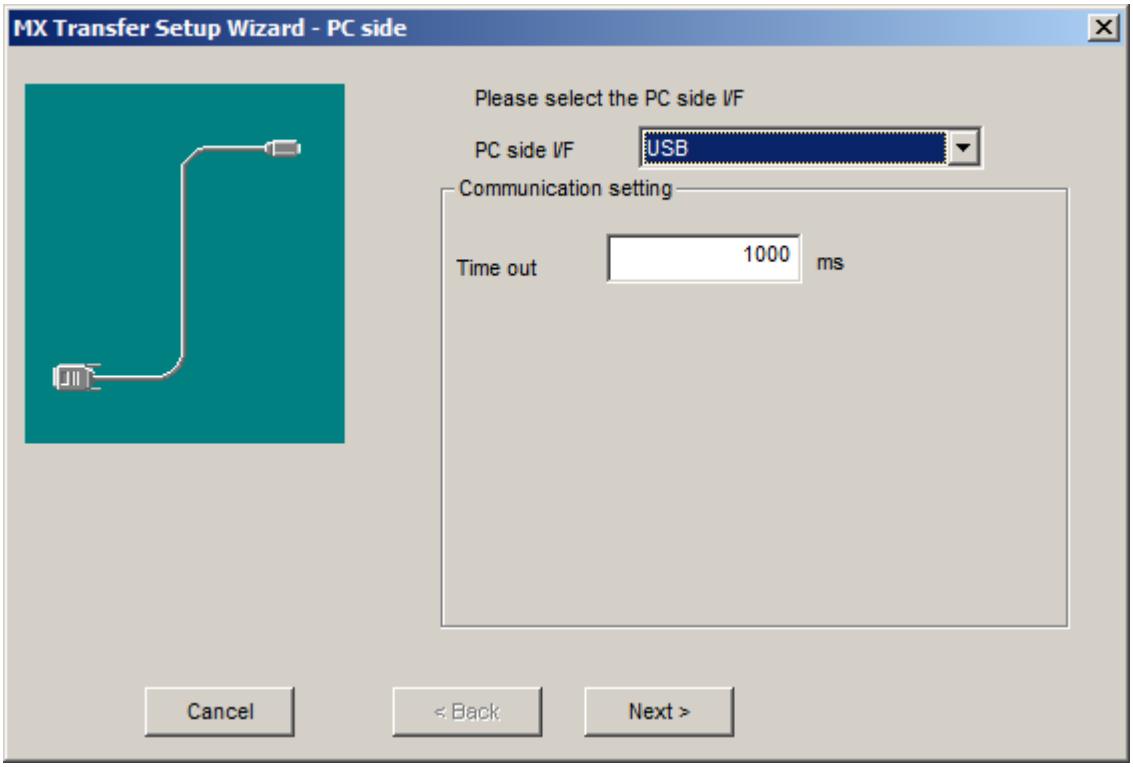


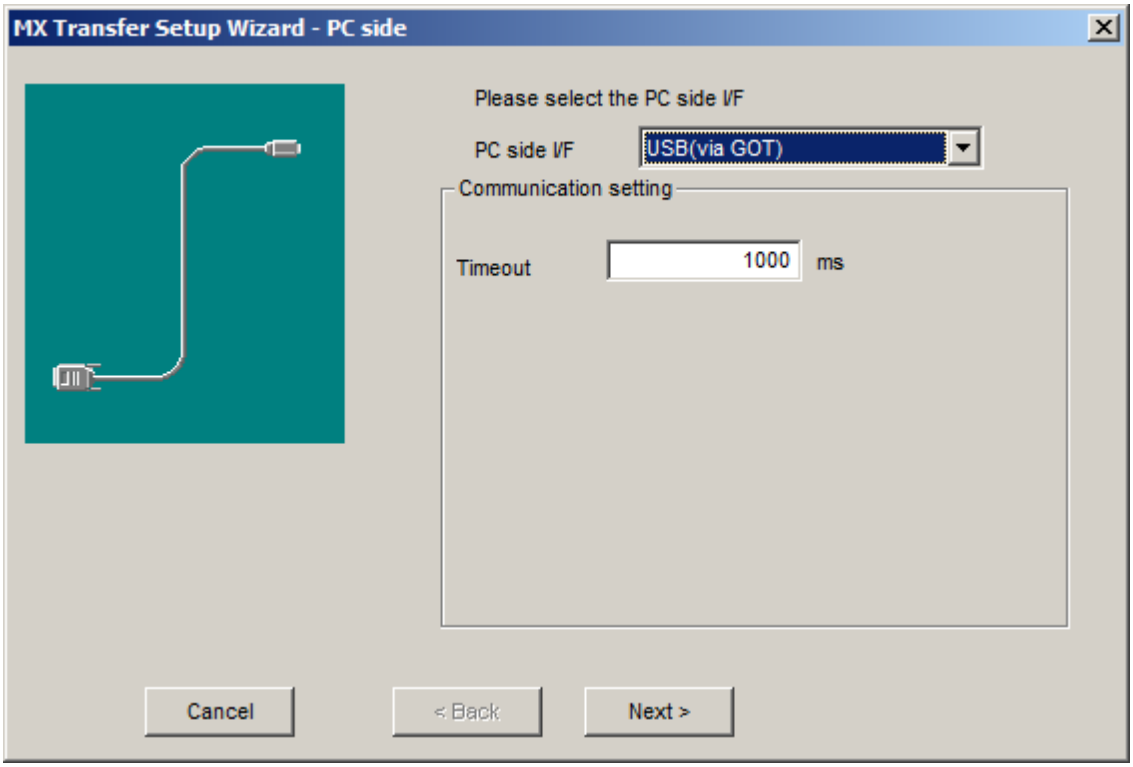

For a description of the editable parameters on the page see PC side USB parameters.
The connected interface on the PLC side is a CPU module.

#### 9.3.2.2 PC Universal Serial Bus (USB) Interface via GOT

Configure a connection from an USB port of the PC to a GOT and from there to a PLC.

## PC side USB parameters

| Parameter | Values | Description |
|---|---|---|
| Time out | 1 - 2147483647 | communication timeout in milliseconds |




For a description of the editable parameters on the page see PC side USB parameters.
Pressing the <**Next**> button opens a page for selecting the connected CPU type.

#### 9.3.2.3 PC RS232 Serial Interface

Configure a serial connection to a PLC.

## PC side serial parameters

| Parameter | | Values | Description |
|---|---|---|---|
| All Ports | | | if cleared, only one of the serial interfaces actually installed in the PC can be selected.<br>if checked, any COM port can be selected. This may be useful when defining a configuration for a different PC. |
| Connect port | 'All Ports' cleared | COM1 - COMn | selects the serial interface in the PC from a list of serial interfaces found on the PC |
| | 'All Ports' checked | COM1 - COM256 | selects the serial interface in the PC from a list of possible serial interfaces |
| Time out | | 1 - 2147483647 | communication timeout in milliseconds |

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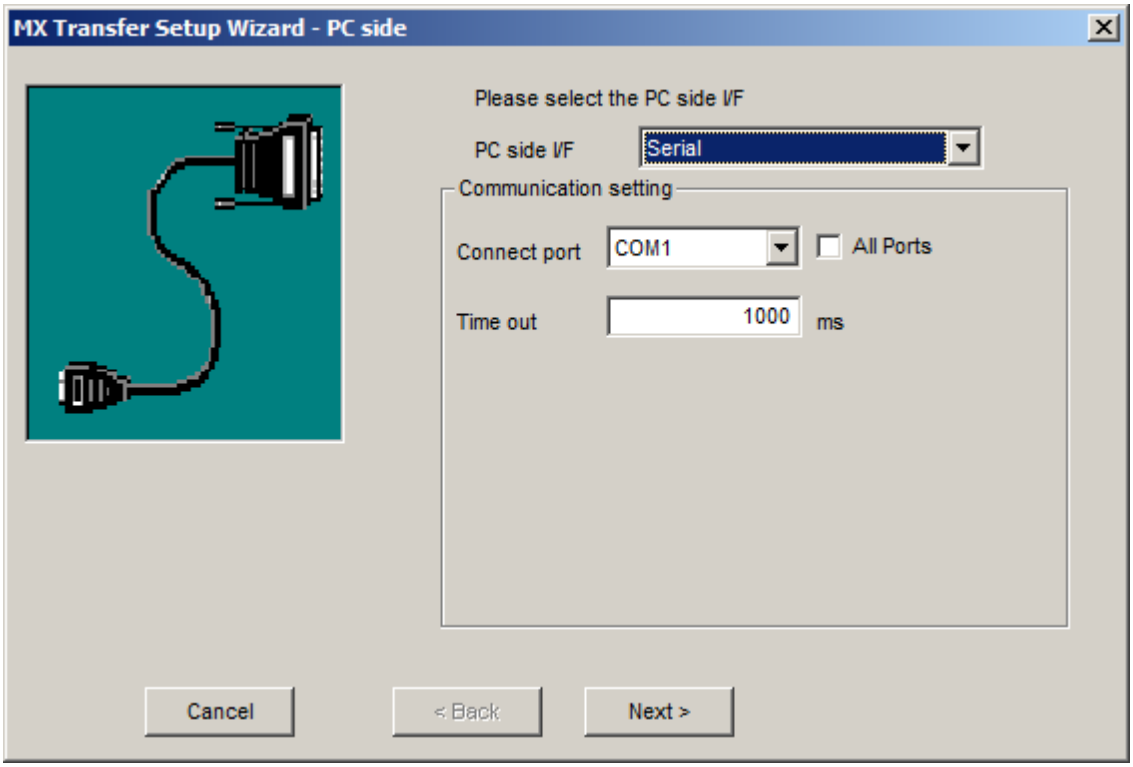


For a description of the editable parameters on the page see PC side serial parameters.
The connected interface on the PLC side can be

- a CPU module (either RS422 or USB interface)
- a C24 module
- a G4 module
- an FX extended port

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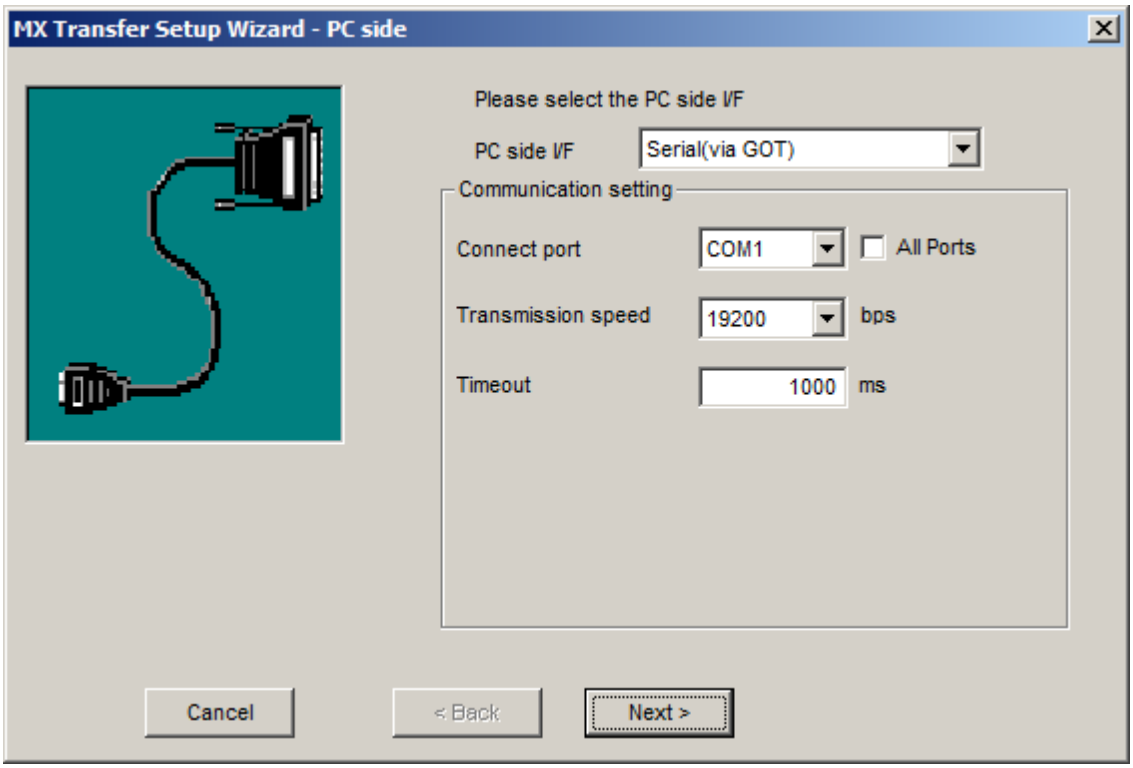
#### 9.3.2.4 PC RS232 Serial Interface via GOT

Configure a serial connection to a GOT and from there to a PLC.

## PC side serial parameters

| Parameter | | Values | Description |
|---|---|---|---|
| All Ports | | | if cleared, only one of the serial interfaces actually installed in the PC can be selected.<br>if checked, any COM port can be selected. This may be useful when defining a configuration for a different PC. |
| Connect port | 'All Ports' cleared | COM1 - COMn | selects the serial interface in the PC from a list of serial interfaces found on the PC |
| | 'All Ports' checked | COM1 - COM256 | selects the serial interface in the PC from a list of possible serial interfaces |
| Transmission speed | | 9600, 19200, 38400, 57600, 115200 | baud rate of the serial connection |
| Timeout | | 1 - 2147483647 | communication timeout in milliseconds |




For a description of the editable parameters on the page see PC side serial parameters.
Pressing the <**Next**> button opens a page for selecting the connected CPU type.

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### 9.3.2.5 PC Ethernet Board

Configure the PC side ethernet interface

## PC side Ethernet parameters

| Parameter | Values | Description |
|---|---|---|
| Connect module | AJ71E71, AJ71QE71, QJ71E71, FX-ENET(-ADP), CPU module, CC IE Field Ethernet adapter | type of PLC ethernet module |
| Protocol | UDP, TCP | connection-less (UDP) or connection-oriented (TCP) protocol<br>**not for FX-ENET(-ADP) modules**<br><br>Precautions for use of TCP protocol<br>(a) Provide an interval longer than the sequence scan time of the Ethernet module loaded station from when the Open method is executed until the Close method is executed.<br>(b) Provide an interval of at least 500ms from when the Close method is executed until the Open method is executed again. |
| Packet type | ASCII, Binary | selects ASCII or binary packet type for communication<br>**only for AJ71E71 and AJ71QE71 modules** |
| Network No | 1 - 239 | network number of the E71 ethernet module, the PC is connected to. The E71 network number is configured in the 'Network Parameters' of the PLC settings.<br>**only for AJ71QE71(UDP) and QJ71E71 modules** |
| Station No. | 1 - 64 | station number of the PC side interface. This number can be freely chosen, but must be unique within the network specified by the network number.<br>**only for AJ71QE71(UDP) and QJ71E71 modules** |
| Port No. | 0 - 65535 | free UDP port number on the PC side for data sent by the PLC. Port numbers below 1025 should not be used.<br>**only for UDP protocol and for GOT module** |
| Time out | 1 - 2147483647 | communication timeout in milliseconds |

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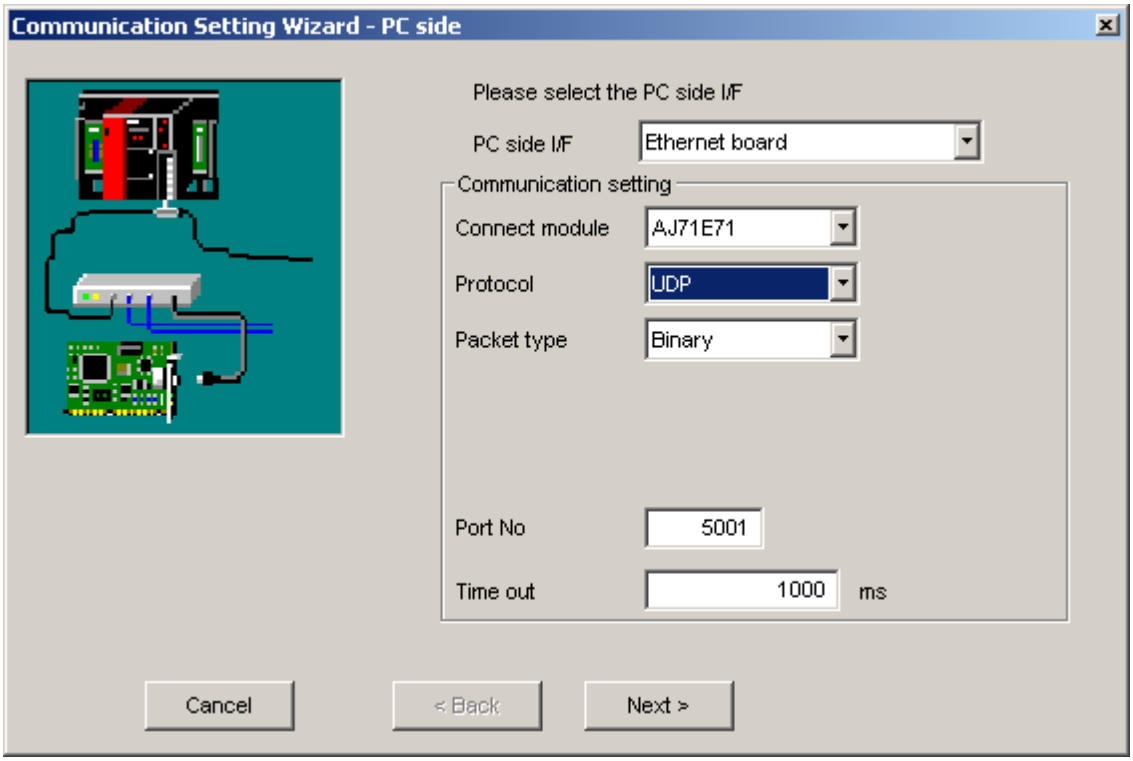
**Note:**
When connecting from several MELSOFT applications to the same E71 module, make the following settings:
(a) set the protocol of the communication setting wizard screen to 'UDP'.
(b) set "SW2" of the communications setting switches of the E71 module to OFF (binary).

The following restrictions apply to simultaneous connections from multiple PCs to the same E71 module using the TCP/IP protocol:
- for Q series-compatible E71 modules (except QJ71E71-100) the first five digits of the serial number must be '02122' or later and the function version must at least be 'B'
- select 'MELSOFT connection' in the Ethernet parameter 'open system' (via the network parameters in GID/GD)

**Note:**
Connecting to the PLC CPU through Ethernet depends on the correct PLC CPU status:
1) **TCP** selected: the target PLC CPU must be in RUN mode
2) **UDP** selected: the target PLC CPU must have been in RUN mode once

**Note:**
When a QnA-, AnU-, Q- (A mode) or motion controller CPU (via E71) are accessed, the device range is equivalent to that of an AnA CPU.

## AJ71E71




For a description of the editable parameters on the page see PC side Ethernet parameters.
Pressing the <**Next**> button opens a page for entering the address of the PLC ethernet module.

### TCP connections

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| Connected Station CPU | | | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|---|---|
| QCPU (A mode) | QnA CPU | A CPU *1 | | QCPU (Q mode) | QCPU (A mode) | QnA CPU | ACPU *1 | FX CPU |
| | *2 | | MELSECNET/H | x | x | x | x | x |
| | | | MELSECNET/10 | x | o | *2 | o | x |
| | | | MELSECNET(II) | x | o | *2 | o | x |
| | | | Ethernet | x | x | x | x | x |
| | | | Computer link | x | x | x | x | x |
| | | | CC-Link | x | x | x | x | x |
| | | | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU
*2 : Operates as the one equivalent to AnACPU

## UDP connections

| Connected Station CPU | | | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|---|---|
| QCPU (A mode) | QnA CPU | A CPU *1 | | QCPU (Q mode) | QCPU (A mode) | QnA CPU | ACPU *1 | FX CPU |
| | *2 | | MELSECNET/H | x | x | x | x | x |
| | | | MELSECNET/10 | x | o | *2 | o | x |
| | | | MELSECNET(II) | x | o | *2 | o | x |
| | | | Ethernet | x | x | x | x | x |
| | | | Computer link | x | x | x | x | x |
| | | | CC-Link | x | x | x | x | x |
| | | | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU
*2 : Operates as the one equivalent to AnACPU

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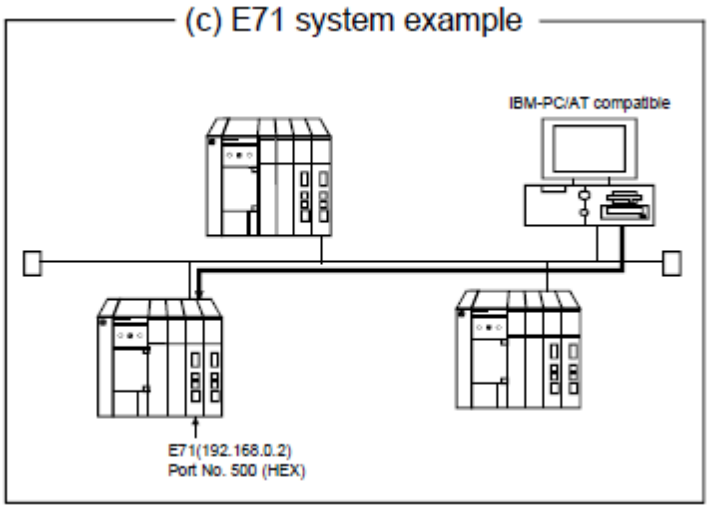


| Switch *1 | | Setting | | | |
|---|---|---|---|---|---|
| | | TCP/IP | | UDP/IP | |
| | | When ASCII packet is used | When binary packet is used | When ASCII packet is used | When binary packet is used |
| Operation mode setting switch | | 0 (online) | | | |
| Communications condition setting switches | Line processing selection for TCP time-out error | OFF | | | |
| | Data code setting | ON (ASCII code) | OFF (binary code) | ON (ASCII code) | OFF (binary code) |
| | CPU communications timing setting) | ON | | | |
| | Initial timing setting | OFF | | | |

*1: For switch numbers, refer to the E71 module manual.

## AJ71QE71

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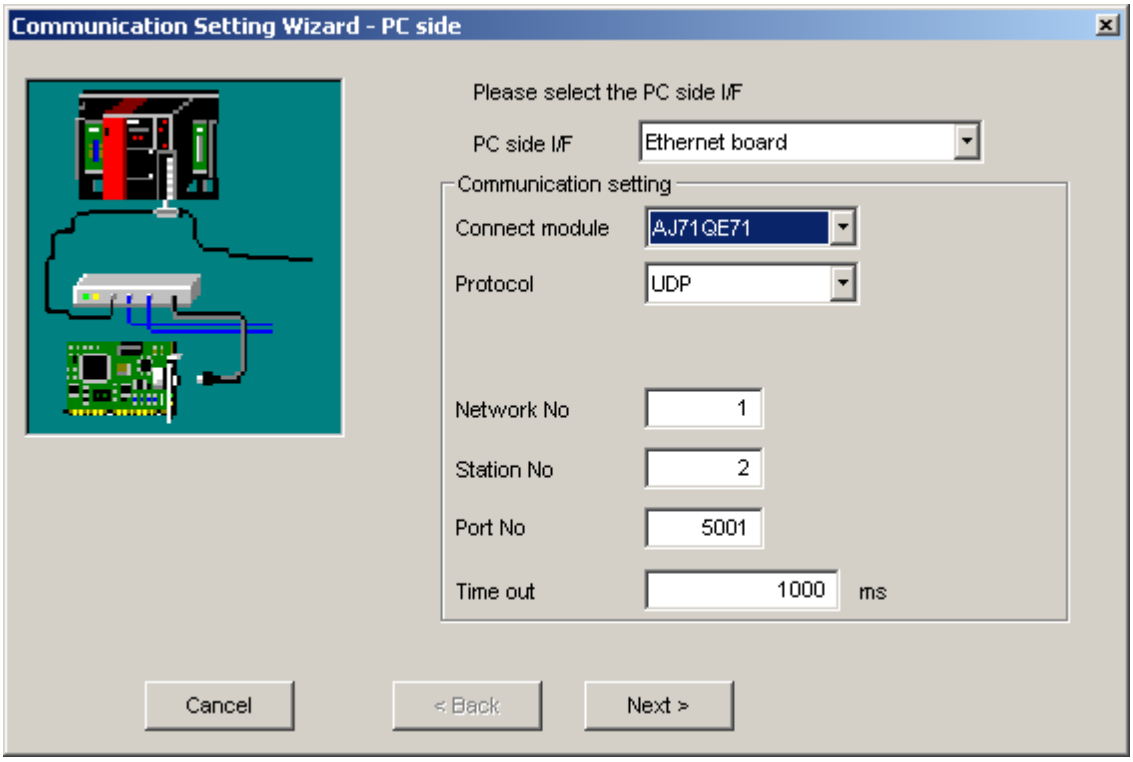


For a description of the editable parameters on the page see PC side Ethernet parameters.
Pressing the <**Next**> button opens a page for entering the address of the PLC ethernet module.

## TCP connections

| Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|
| QnACPU | | QCPU (Q mode) | QCPU (A mode) | QnA CPU | ACPU *1 | FX CPU |
| | MELSECNET/H | x | x | x | x | x |
| | MELSECNET/10 | x | x | o | x | x |
| | MELSECNET(II) | x | x | x | x | x |
| | Ethernet | x | x | x | x | x |
| | Computer link | x | x | x | x | x |
| | CC-Link | x | x | x | x | x |
| | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU

## UDP connections

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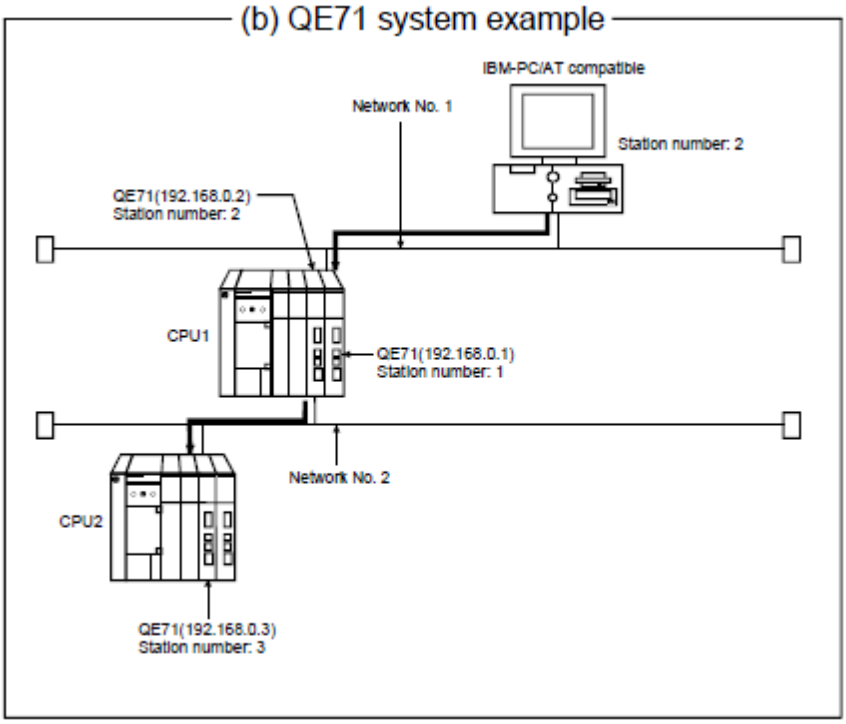
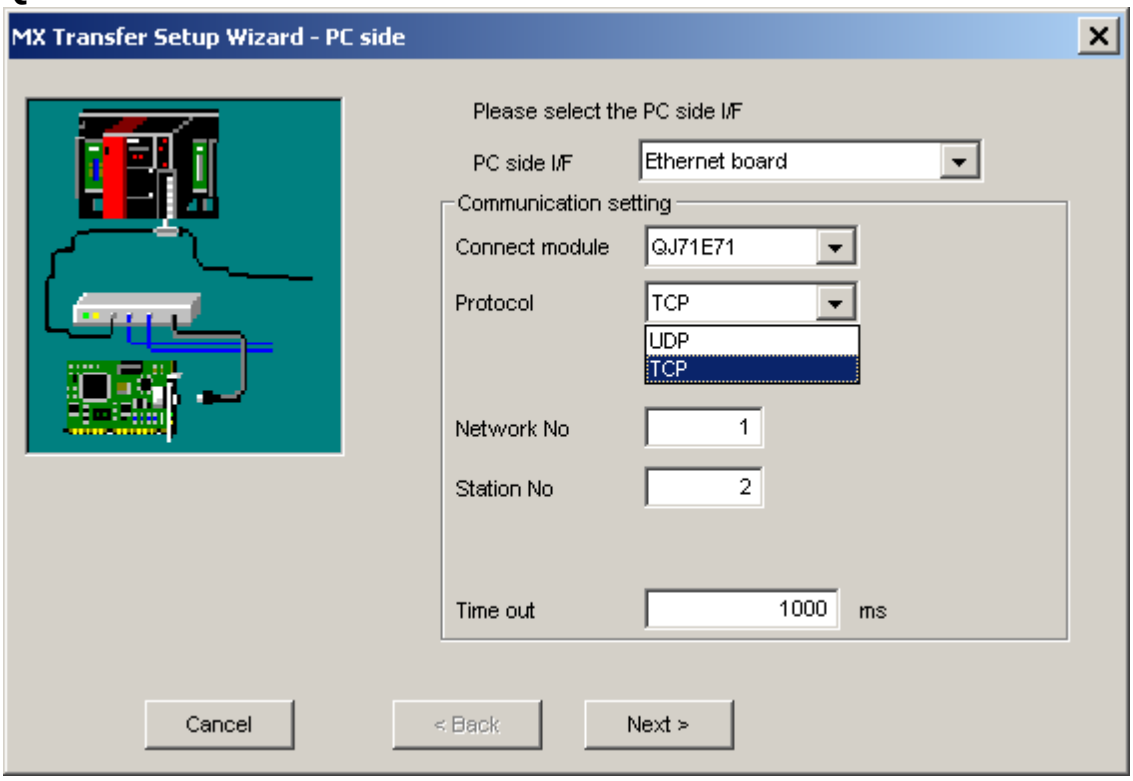
| Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|
| QnACPU | | QCPU (Q mode) | QCPU (A mode) | QnA CPU | ACPU *1 | FX CPU |
| | MELSECNET/H | x | x | x | x | x |
| | MELSECNET/10 | x | x | o | x | x |
| | MELSECNET(II) | x | x | x | x | x |
| | Ethernet | x | x | o | x | x |
| | Computer link | x | x | o | x | x |
| | CC-Link | x | x | x | x | x |
| | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU



| Switch (Switch Number) | | Setting | | |
|---|---|---|---|---|
| | | TCP / IP | | UDP / IP |
| | | When ASCII packet is used | When binary packet is used | When binary packet is used |
| Operation mode setting switch | | 0 (online) | | |
| Communications condition setting switches | Line processing selection for TCP time-out error (SW1) | OFF | | |
| | Data code setting (SW2) | ON (ASCII code) | OFF (binary code) | As set by user |
| | Automatic start mode setting (SW3) | OFF | | ON |
| | — (SW4 to SW6) | All OFF | | |
| | CPU communications timing setting (SW7) | ON | | |
| | Initial timing setting (SW8) | OFF | | |

## QJ71E71

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For a description of the editable parameters on the page see PC side Ethernet parameters.
Pressing the <**Next**> button opens a page for entering the address of the PLC ethernet module.

## TCP connections

| Connected Station CPU | | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|
| QCPU (Q mode) | Relayed Network | QCPU (Q mode) | QCPU (A mode) | QnA CPU | ACPU *1 | FX CPU |
| | MELSECNET/H | o | x | x | x | o |
| | MELSECNET/10 | o | o | o | o | x |
| | MELSECNET(II) | x | x | x | x | x |
| | Ethernet | o | x | o | x | x |
| | Computer link | *2 | x | x | x | x |
| | CC-Link | o | o | o | o | x |
| | CC-Link IE | *3 | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU
*2 : For the Redundant PLC, access is disabled
*3 : partially supported, depends on CPU type

## UDP connections

| Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|
| QCPU (Q mode) | | QCPU (Q mode) | QCPU (A mode) | QnA CPU | ACPU *1 | FX CPU |
| | MELSECNET/H | o | x | x | x | o |
| | MELSECNET/10 | o | o | o | o | x |
| | MELSECNET(II) | x | x | x | x | x |
| | Ethernet | o | x | o | x | x |
| | Computer link | *2 | o | x | x | x |
| | CC-Link | o | o | o | o | x |
| | CC-Link IE | *3 | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU
*2 : For the Redundant PLC, access is disabled
*3 : partially supported, depends on CPU type

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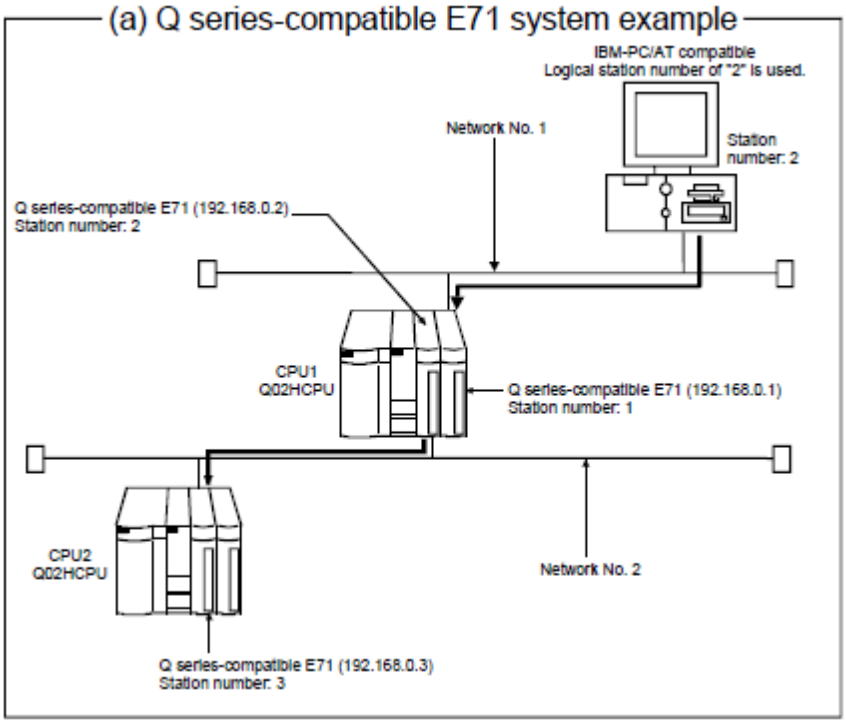
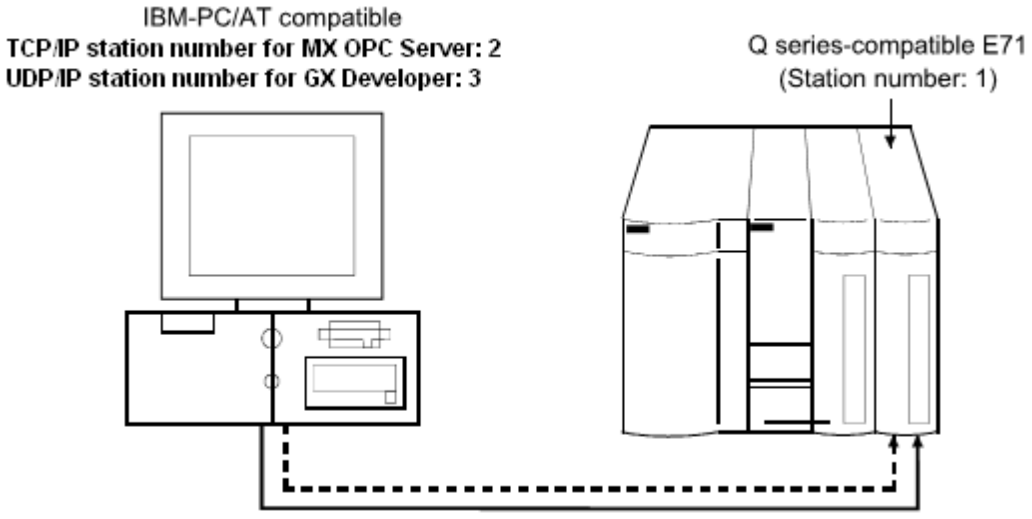



### Simultaneous use of different protocol types

When two different communication systems (protocols) are used to access the same Q series-compatible E71 with a serial number before 05051 from one PC, different station numbers must be set for TCP/IP and for UDP/IP.

(Example) When MX OPC Server uses TCP and GX Developer uses UDP


IBM-PC/AT compatible
TCP/IP station number for MX OPC Server: 2
UDP/IP station number for GX Developer: 3
Q series-compatible E71
(Station number: 1)

## FX Ethernet Module

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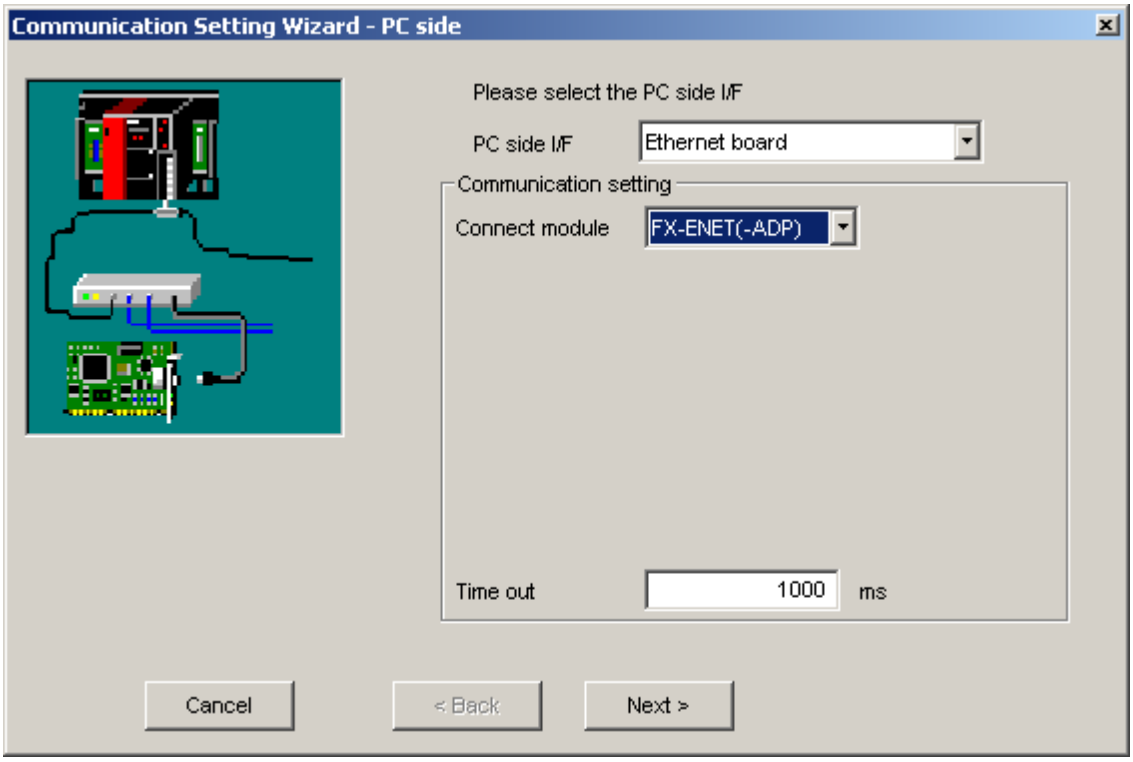
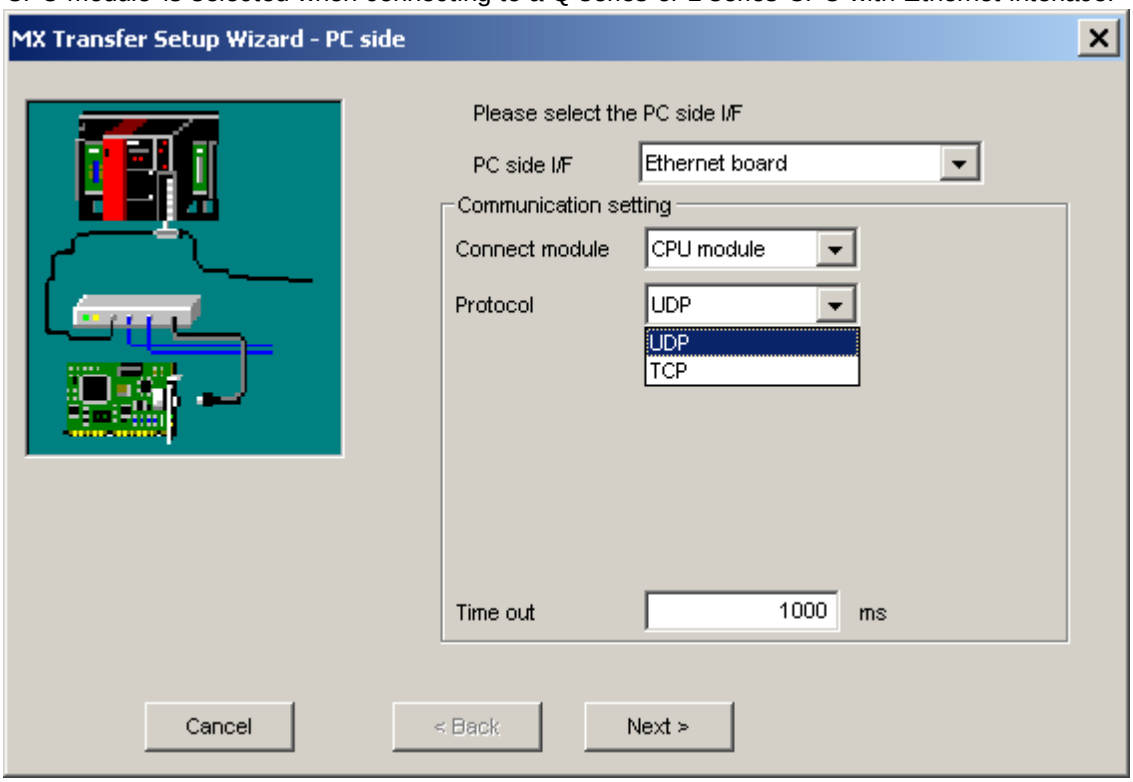



For a description of the editable parameters on the page see PC side Ethernet parameters.
Pressing the <**Next**> button opens a page for entering the address of the PLC ethernet module.

## CPU Module

'CPU module' is selected when connecting to a Q-series or L-series CPU with Ethernet interface.




Pressing the <**Next**> button opens a page to search for the PLC CPU or to manually enter its IP address.

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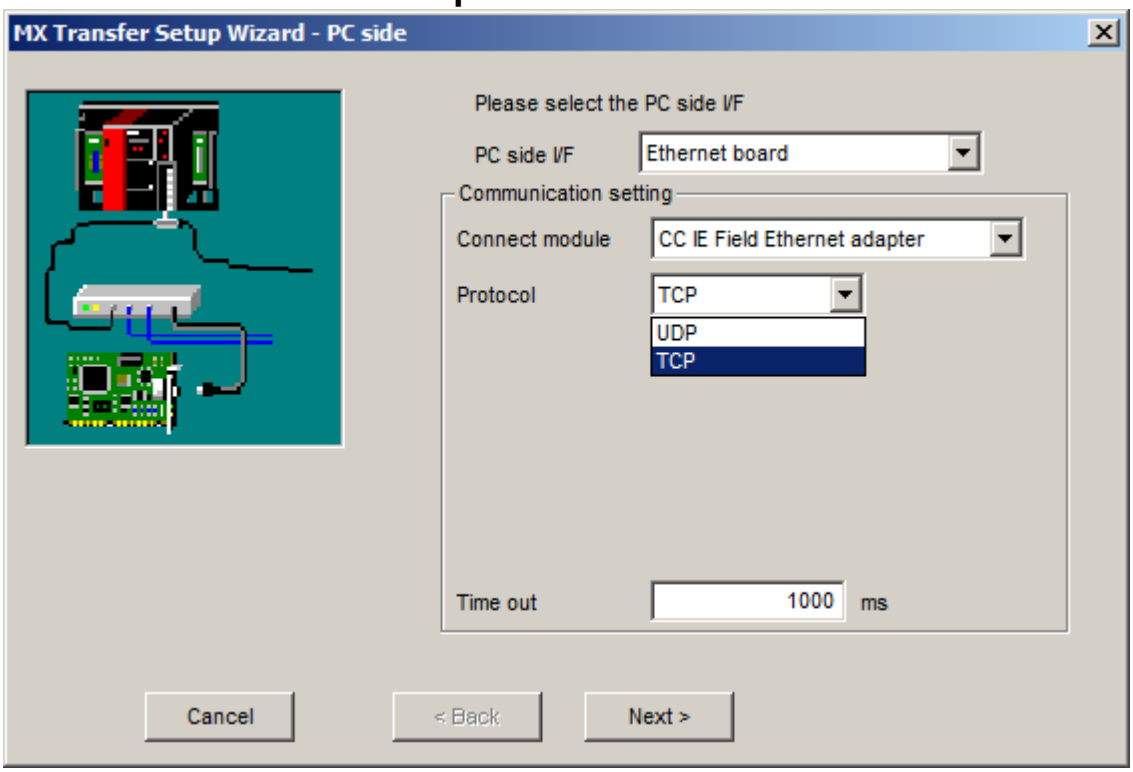
## CC IE Field Ethernet Adapter




Pressing the <**Next**> button opens a page for entering the address of the CC-Link IE Field ethernet adapter.

### 9.3.2.6 PC Ethernet Board via GOT

Configure an Ethernet connection to a GOT and from there to a PLC.

## PC side Ethernet parameters

| Parameter | Values | Description |
|---|---|---|
| Time out | 1 - 2147483647 | communication timeout in milliseconds |

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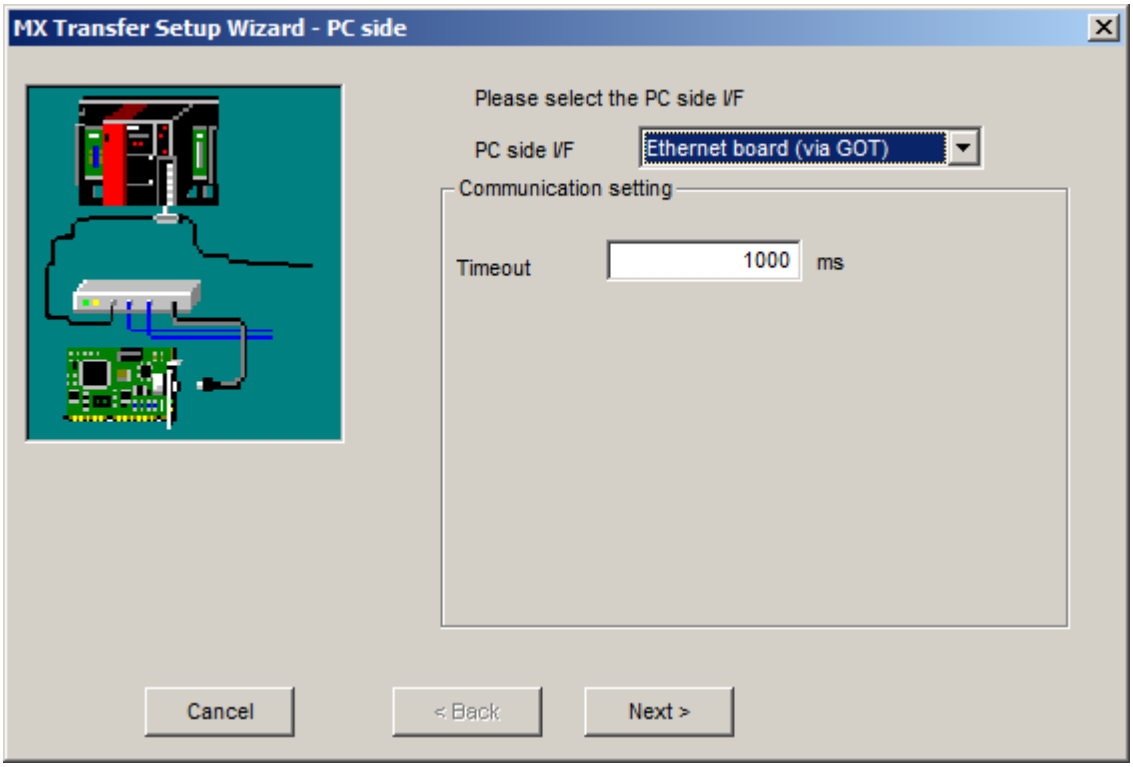


For a description of the editable parameters on the page see PC side Ethernet parameters.
Pressing the <**Next**> button opens a page for selecting the connected CPU type.

### 9.3.2.7 PC Modem

Configure a dial-up connection via modem.

| | |
|---|---|
| | **Note:**<br>It is recommended to configure and test the connection in GX Developer or GX IEC Developer before using this wizard. |

## PC side modem parameters

| Parameter | Values | Description |
|---|---|---|
| All Ports | | if cleared, only one of the serial interfaces actually installed in the PC can be selected<br>if checked, any COM port can be selected. This may be useful when defining a configuration to a different PC |
| Connect port | 'All Ports' flag cleared | selects the serial interface in the PC from a list of serial interfaces found on the PC |
| | 'All Ports' flag checked | selects the serial interface in the PC from al list possible serial interfaces |
| Connect module | Q6TEL(QnA), FXCPU, AJ71QC24N, QJ71C24, | type of remote PLC module |

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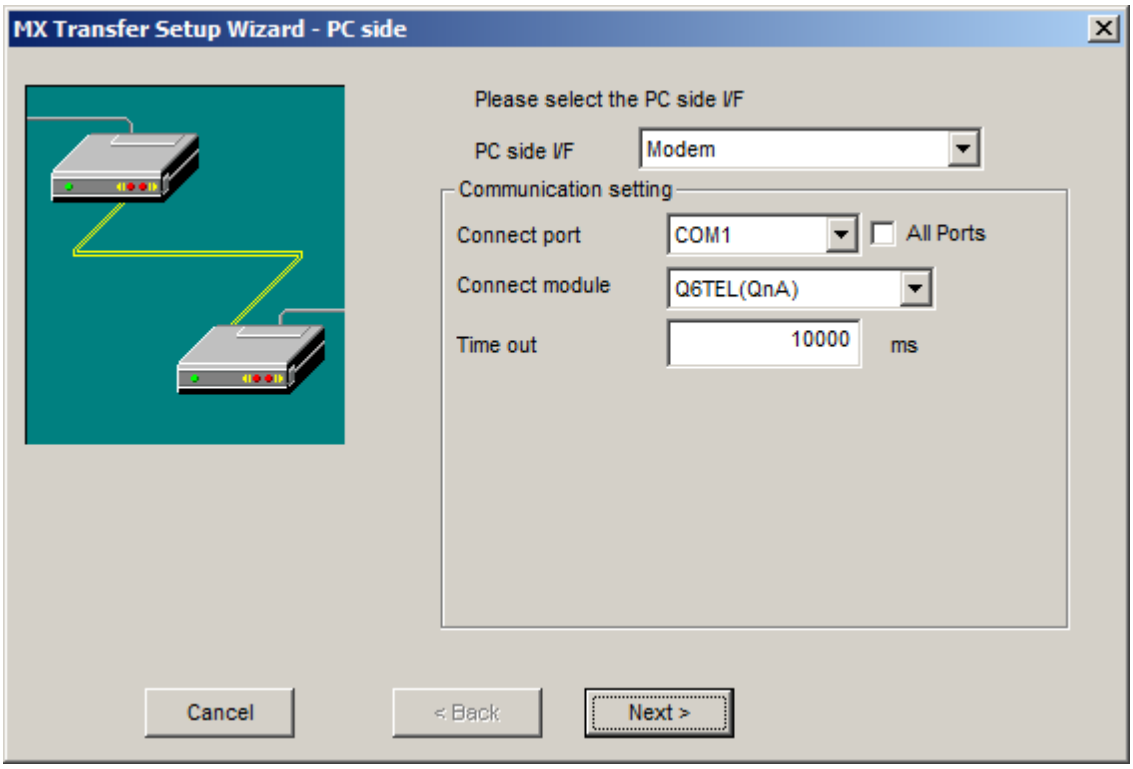
| Parameter | Values | Description |
|---|---|---|
| | QJ71CMO, LJ71C24 | |
| Time out | 1 - 2147483647 | communication timeout in milliseconds |

**Note:**
Simultaneous modem communication by several MELSOFT applications is not supported. Communication errors, a disconnection of the telephone line or similar problems may occur.




For a description of the editable parameters on the page see PC side modem parameters.
Pressing the <**Next**> button opens a page for configuring the modem connection (e.g. telephone number etc.).

9.3.2.7.1 Modem Line Settings

Enter the parameters for the modem connection to a remote PLC including the phone number and any AT commands to configure the local modem.

**Note:**
(a) Do not use a call-waiting phone line.
On a call-waiting phone line, data corruption, telephone line disconnection or similar may occur due to interrupt reading sounds.
(b) Do not connect the line to master/slave phones.
If the slave phone picks up while the telephone line is connecting to the master/slave phones, the telephone line may be disconnected.
(c) Use an analog 2 wire type telephone line.
When using a digital line, use a terminal adaptor.
When the telephone line is of 4 wire type, the line may not be connected depending on

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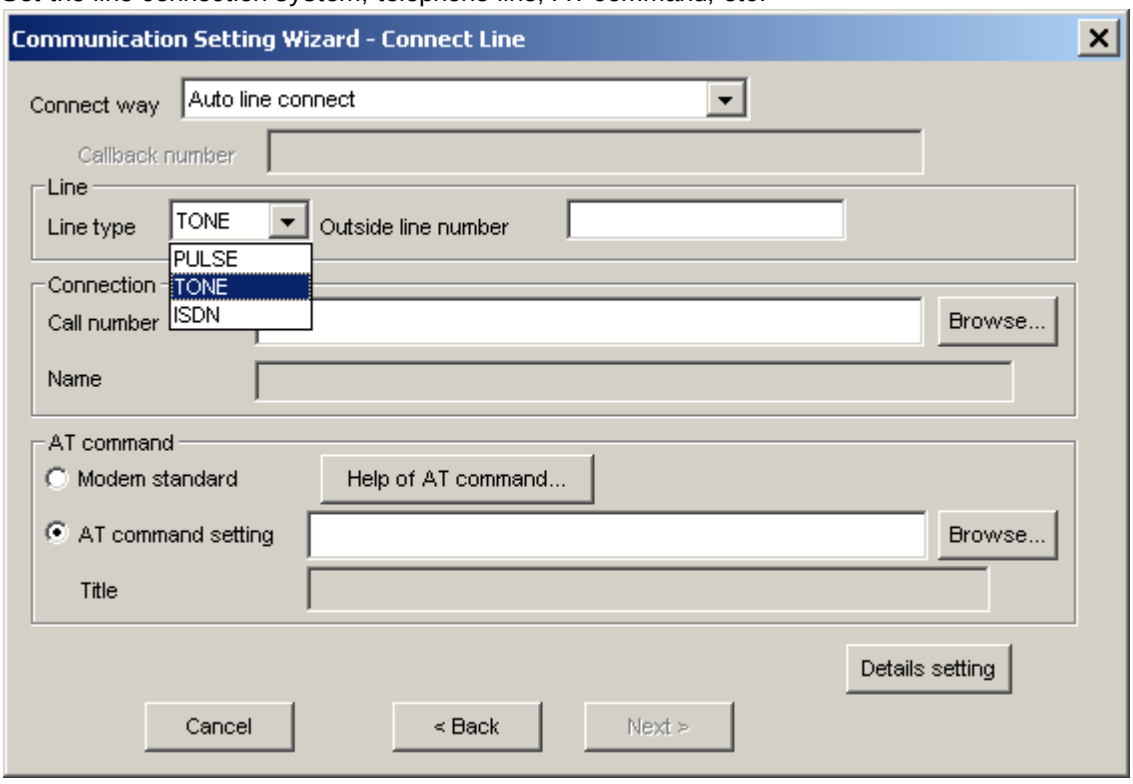
| | |
|---|---|
| | the wiring type of the modular jack.<br>For the 4 wire type conduct connection tests in advance to check for connection. |

| | |
|---|---|
| | **Note:**<br>(a) Modem for radio communication using a cellular phone<br>Although the modem name is different depending on the maker, the modem is generically referred to as the cellular phone communication unit in this manual. Select the model of the cellular phone communication unit according to the cellular phone used.<br>For details, contact the company of your cellular phone.<br>(b) Cellular phone without auto answer function<br>For a cellular phone without auto answer function, use a cellular phone communication unit that has the ANS/ORG/TEL select switch. If the cellular phone communication unit does not have the ANS/ORG/TEL<br>select switch, it is impossible to connect the line. The line connection procedure is different depending on the cellular phone company and cellular phone model.<br>For details, contact the maker of your cellular phone. |

## Connect line dialog

Set the line connection system, telephone line, AT command, etc.




| | |
|---|---|
| | **Note:**<br>The '**Next**' button is disabled, if no number has been entered in the 'Call number' field. |

| Item | Description |
|---|---|
| Connect way | fixed to 'Auto line connect' |
| Callback number | not available |

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| Item | | Description |
|---|---|---|
| Line | Line type | set the line type (Default: Tone) |
| | Outside line number | set the outside line access number. The number must not exceed a length of 10 characters and can consist of 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, -, # |
| Connecti on target | Call number | enter the telephone number of the connection target.<br>When the connection target has been selected on the phone book screen, the telephone number of the connection target appears.<br>The phone number must not exceed a length of 50 characters and can consist of 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, -, # |
| | Name | an optional name, which has been assigned to the phone number in the phone book |
| | Browse | displays the phone book screen. For details see 'Call book dialog' |
| AT command | Modem standard | when selected the standard AT commands are used |
| | AT command setting | AT command sequence to initialize the local modem<br>The command must not exceed a length of 70 ASCII characters |
| | Title | the optional title of the AT command selected in the AT command registration screen |
| | Browse | displays the AT command registration screen. For details see 'AT command registration dialog' |
| | Help of AT command | displays the AT command help |
| Details setting | | displays the 'Details setting dialog' |

## Call book dialog

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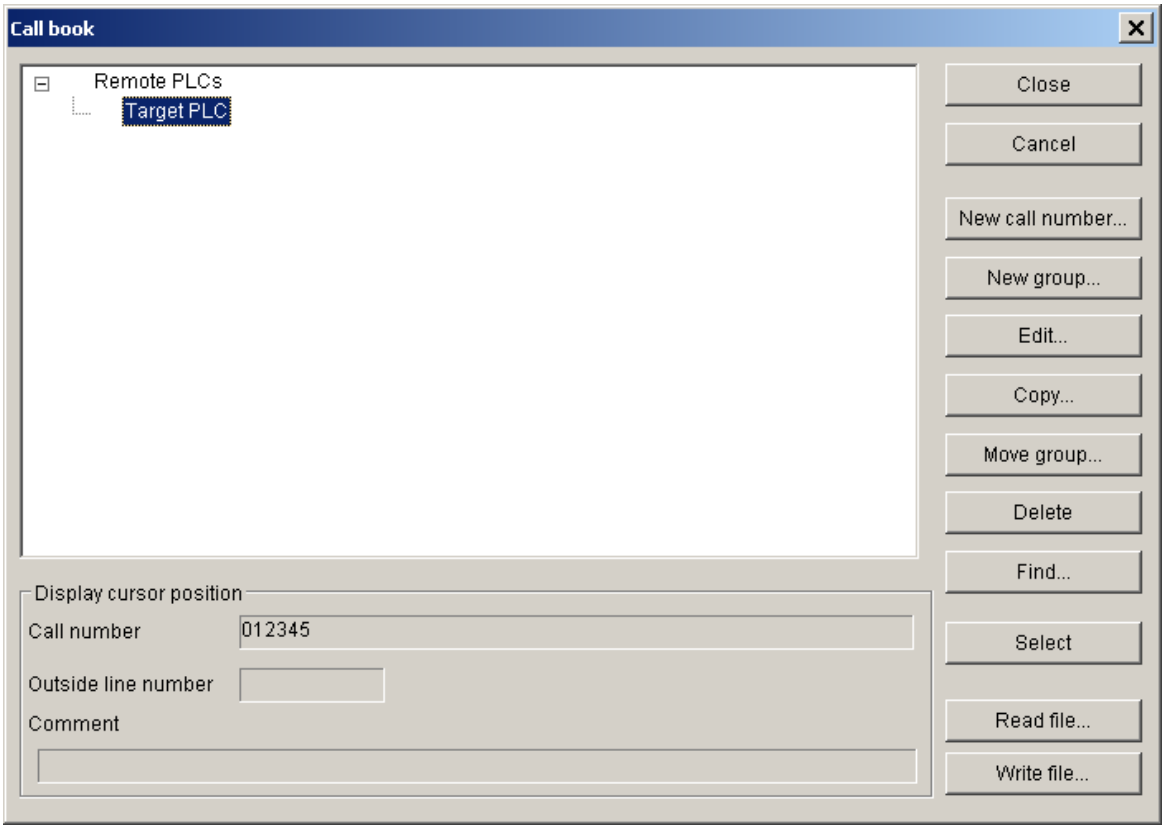


| Item | Description |
|---|---|
| Close | store the edited data and close the phone book dialog |
| Cancel | discard the edited data and close the phone book dialog |
| New call number | open the 'Call number setting dialog' to enter a new phone number |
| New group | create a new group; opens the 'Group setting' dialog for entering the group name |
| Edit | if a group is selected, the 'Group setting' dialog is opened. Otherwise it opens the 'Call number setting dialog' to edit a phone number |
| Copy | copies the selected phone number to a different group (see 'Select phone group name') |
| Move group | moves the selected phone number to a different group (see 'Select phone group name') |
| Delete | deletes the selected phone number or group. Only empty groups can be deleted. If a group is not empty, the phone numbers must be deleted first. |
| Find | used to search phone numbers and associated names (see 'Find a phone number') |
| Select | closes the dialog and copies the selected phone number to the line dialog |

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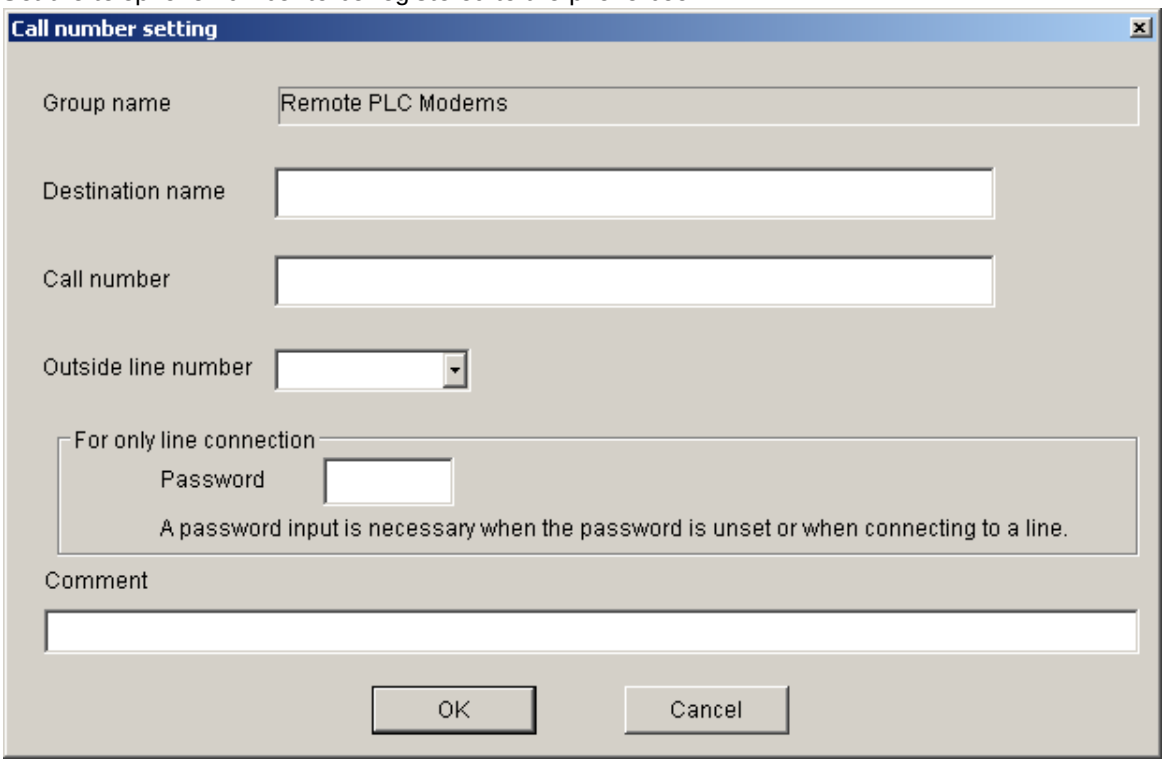
| Item | Description |
|---|---|
| Read file | reads phone numbers from a file selected by the user |
| Write file | stores the contents of the phone book in a file selected by the user |

## Call number setting dialog

Set the telephone number to be registered to the phone book.




| Item | Description |
|---|---|
| Group name | the group name of the registration destination. |
| Destination name | name associated with the phone number |
| Call number | enter the telephone number of the connection target.<br>The phone number must not exceed a length of 50 characters and can consist of 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, -, , # |
| Outside line number | set the outside line access number.<br>The number must not exceed a length of 10 characters and can consist of 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, -, , # |
| For only line connection | if a password has been set in A6TEL, Q6TEL or Q series C24 for remote access, the password must be entered here in order to access the target PLC |
| Comment | an optional comment describing the phone number |

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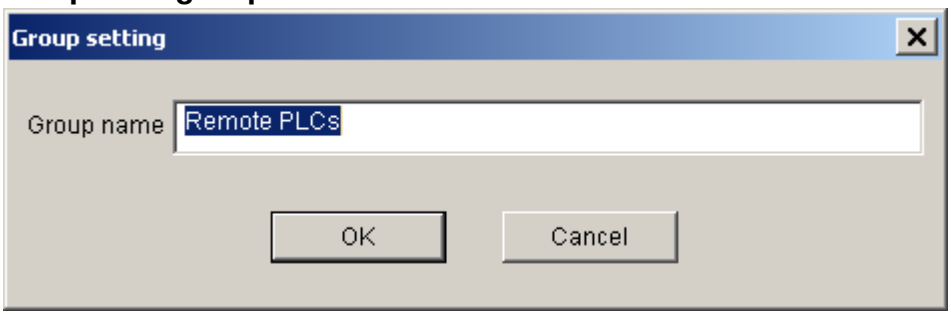
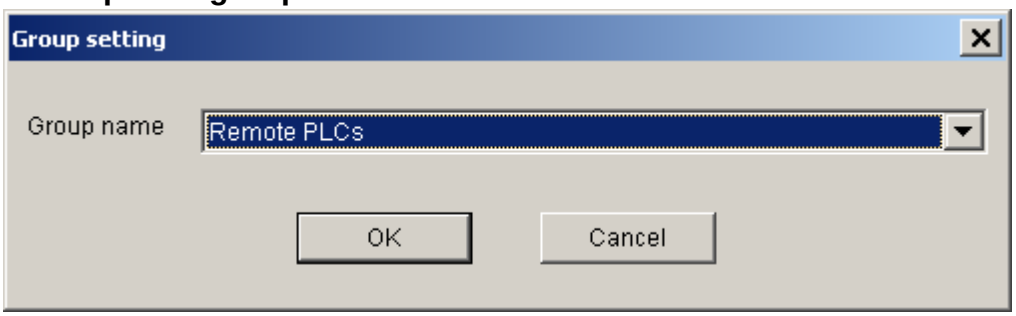
### Edit phone group name



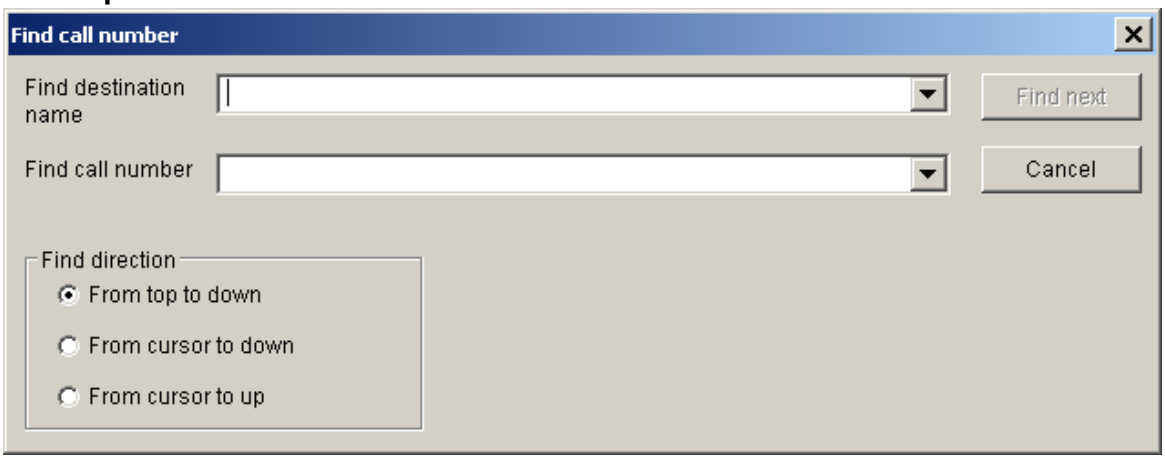

Enter the name for a group of telephone numbers.

### Select phone group name




Select the name of the group, where the selected phone number is copied to.

### Find a phone number




Search the phone book for a given name or number.

## AT command registration dialog

Set the AT commands used on the line setting screen.

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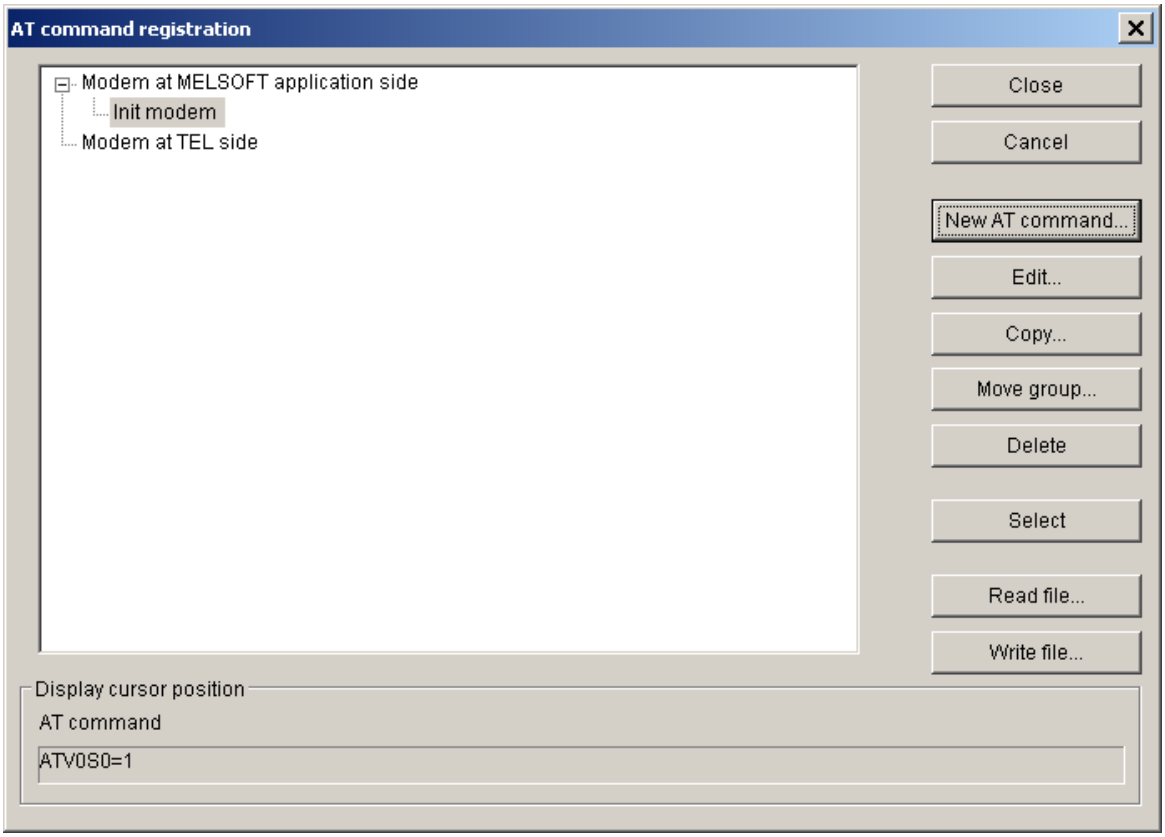


| Item | Description |
|---|---|
| Close | store the edited data and close the AT command registration dialog |
| Cancel | discard the edited data and close the AT command registration dialog |
| New AT command | define a new AT command. For details see 'AT command edit dialog' |
| Edit | edit an existing AT command. For details see 'AT command edit dialog' |
| Copy | copy the selected command to a different group (see 'Select AT command group name') |
| Move group | move the selected command to a different group (see 'Select AT command group name') |
| Delete | delete the selected AT command |
| Select | Used to display the AT command selected in the AT command display list on the line setting screen. |
| Read file | reads AT commands from a file selected by the user |
| Write file | stores the AT commands in a file selected by the user |

## AT command edit dialog

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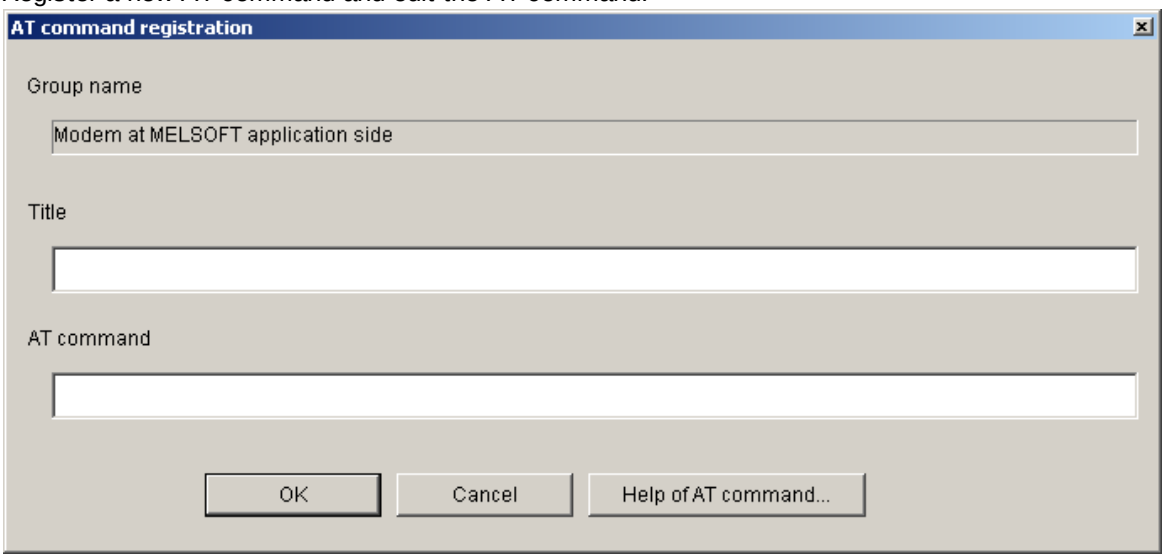
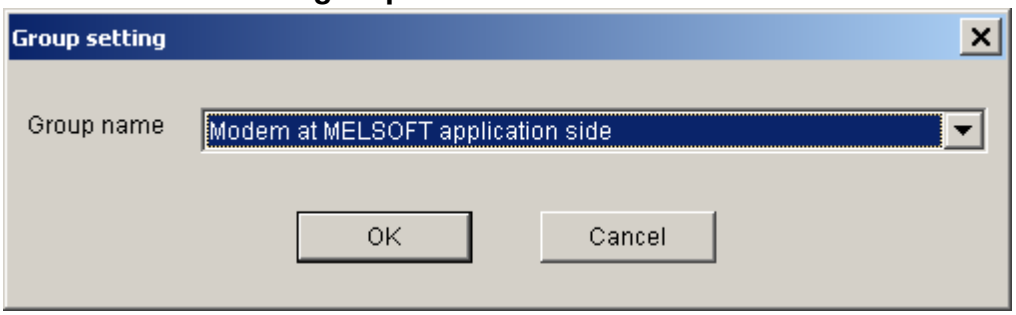
Register a new AT command and edit the AT command.




| Item | Description |
|---|---|
| Group name | displays the name of the group to which the AT command is assigned |
| Title | a name for the AT command (max 60 ASCII characters) |
| AT command | enter the AT command for modem initialization (max. 70 ASCII characters) |
| Help of AT command | displays the AT command help |

### Select AT command group name




Select the name of the group, where the selected AT command is copied to.

## Details setting dialog

Set details for telephone line connection.

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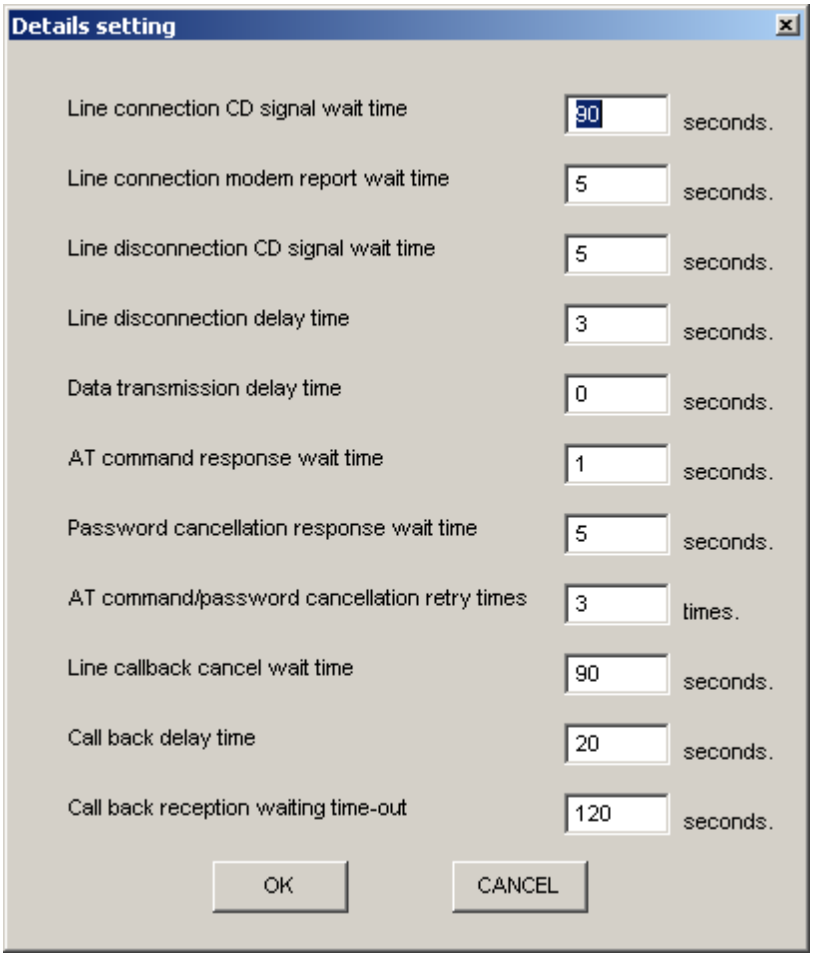


| Item | Description |
|---|---|
| Line connection CD signal wait time | Set the maximum time to wait for the carrier-detect signal to be set (Default: 90)<br>Increase the time, if the CD signal does not turn ON within the set time depending on the line-connected region (example: overseas).<br>Setting range: 1 to 999 |
| Line connection modem report waiting time | Set the line connection modem report wait time. (Default: 5)<br>Increase the set time if the response speed of the modem is low.<br>Setting range: 1 to 999 |
| Line disconnection CD signal wait time | Set the maximum time to wait for the carrier-detect signal to be dropped (Default: 5)<br>Increase the set time if the CD signal does not turn OFF within the preset time depending on the line-connected region (example: overseas).<br>Setting range: 1 to 999 |
| | Set the line disconnection delay time. (Default: 3) |

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| Item | Description |
|---|---|
| Line disconnection delay time | Increase the set time if the response speed of the modem is low.<br>Setting range: 1 to 999 |
| Data transmission delay time | Set the data transmission delay time. (Default: 0)<br>Increase the set time if the response speed of the modem is low.<br>Setting range: 1 to 999 |
| AT command response wait time | Set the AT command response wait time. (Default: 1)<br>Increase the set time if the response speed of the modem is low.<br>Setting range: 1 to 999 |
| Password cancellation response wait time | Set the password cancellation response wait time. (Default: 5)<br>Increase the set time if the quality of the line with the other end is low.<br>Setting range: 1 to 999 |
| AT command/ password cancellation retry times | Set the AT command/password cancellation retry count. (Default: 3)<br>Increase the set count if the AT command cannot be sent or the password cannot be canceled.<br>Setting range: 1 to 999 |
| Line callback cancel wait time | Set the Line callback cancel wait time. (Default: 90)<br>Increase the set time if the line at the other end (Q series corresponding C24 side) is not disconnected within the set time depending on the line-connected region (example: overseas).<br>Setting range: 1 to 180 |
| Call back delay time | Set the callback delay time. (Default: 20)<br>Increase the set time if the device for relaying connection to the line (example: modem, etc.)<br>requires the set time for reconnection after line disconnection.<br>Setting range: 1 to 999 |
| Call back reception waiting time-out | Set the callback reception waiting time-out. (Default: 120)<br>Increase the set time if a time-out occurs in a callback receive waiting status.<br>Setting range: 1 to 3600 |

#### 9.3.2.8 PC CC-Link IE Control Board

A connection between PC and PLC via CC-Link IE requires the CC-Link IE interface board and the corresponding driver to be installed in the PC.

## PC side CC-Link IE Control parameters

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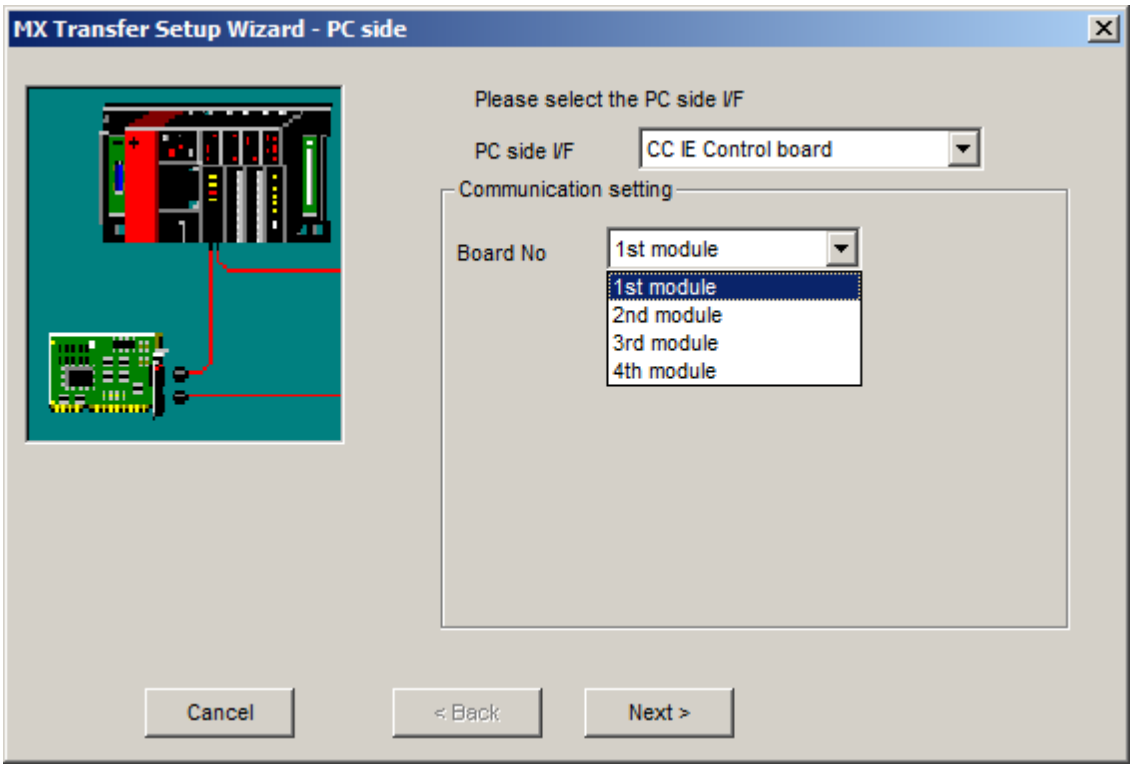
| Parameter | Values | Description |
|---|---|---|
| Board No. | 1st, 2nd, 3rd, 4th module | selects the interface board in the PC |




For a description of the editable parameters on the page see PC side CC-Link IE parameters.
The PLC station, to which a connection is established, can be either

- the host station
- a different station in an attached network
- a different station in a separate network

## Q CPU (Q mode)

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| Own Board | Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|---|
| | QCPU (Q mode) | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| o | o | MELSECNET/H | o | x | x | x | x |
| | | MELSECNET/10 | o | x | x | x | x |
| | | MELSECNET(II) | x | x | x | x | x |
| | | Ethernet | o | x | x | x | x |
| | | Computer link | x | x | x | x | x |
| | | CC-Link | x | x | x | x | x |
| | | CC-Link IE | *2 | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU
*2 : partially supported, depends on CPU type

## Q CPU (A mode)

| Own Board | Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|---|
| | QCPU (A mode) | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| o | o | MELSECNET/H | x | x | x | x | x |
| | | MELSECNET/10 | x | x | x | x | x |
| | | MELSECNET(II) | x | x | x | x | x |
| | | Ethernet | x | x | x | x | x |
| | | Computer link | x | x | x | x | x |
| | | CC-Link | x | x | x | x | x |
| | | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU

## QnA CPU

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| Own Board | Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|---|
| | QnACPU | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| o | o | MELSECNET/H | x | x | x | x | x |
| | | MELSECNET/10 | x | x | o | x | x |
| | | MELSECNET(II) | x | x | x | x | x |
| | | Ethernet | x | x | o | x | x |
| | | Computer link | x | x | x | x | x |
| | | CC-Link | x | x | x | x | x |
| | | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU

**A CPU**

| Own Board | Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|---|
| | ACPU *1 | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| o | o | MELSECNET/H | x | x | x | x | x |
| | | MELSECNET/10 | x | x | x | x | x |
| | | MELSECNET(II) | x | x | x | x | x |
| | | Ethernet | x | x | x | x | x |
| | | Computer link | x | x | x | x | x |
| | | CC-Link | x | x | x | x | x |
| | | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU

#### 9.3.2.9 PC MELSECNET/H Board

A connection between PC and PLC via MELSECNET/H requires the MELSECNET/H interface board and the corresponding driver to be installed in the PC.

## PC side MELSECNET/H parameters

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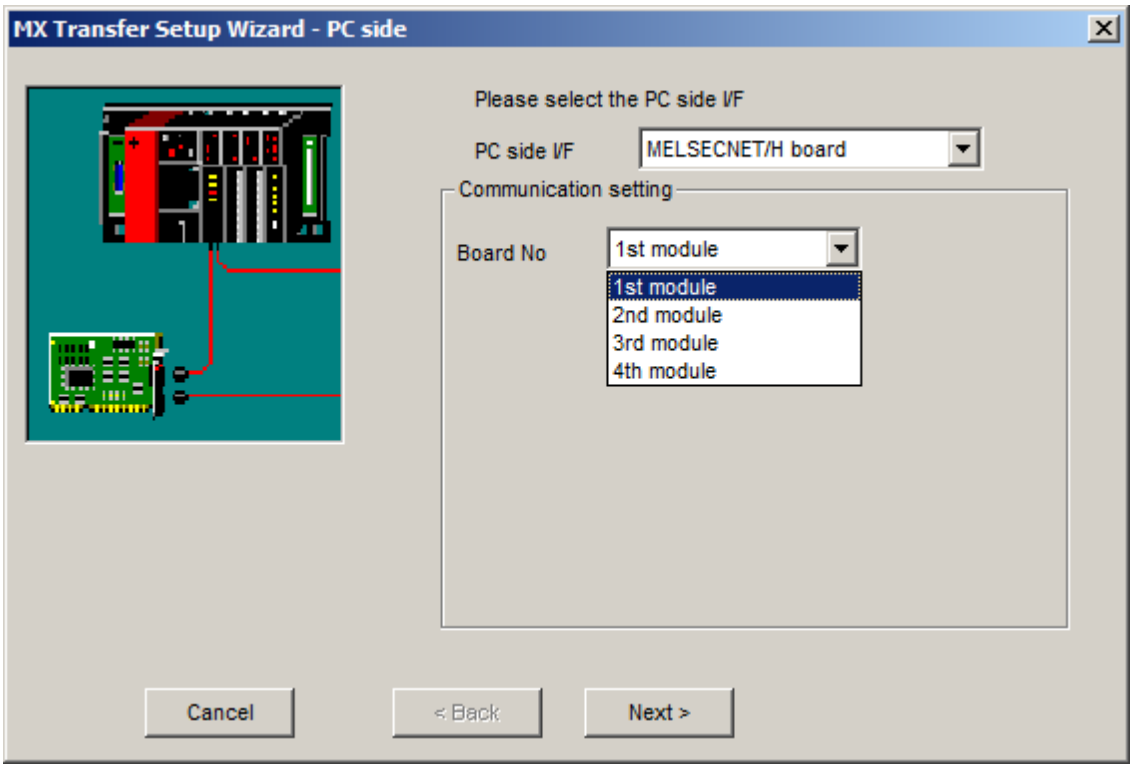
| Parameter | Values | Description |
|---|---|---|
| Board No. | 1st, 2nd, 3rd, 4th module | selects the interface board in the PC |




For a description of the editable parameters on the page see PC side MELSECNET/H parameters.
The PLC station, to which a connection is established, can be either

- the host station
- a different station in an attached network
- a different station in a separate network

## MELSECNET/H mode to Q CPU (Q mode)

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| Own Board | Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|---|
| | QCPU (Q mode) | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| o | o | MELSECNET/H | o | x | x | x | x |
| | | MELSECNET/10 | o | o | o | o | x |
| | | MELSECNET(II) | x | x | x | x | x |
| | | Ethernet | o | x | x | o | x |
| | | Computer link | *3 | x | o | x | x |
| | | CC-Link | o | x | x | x | o |
| | | CC-Link IE | *4 | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU
*2 : Operates only when QCPU (Q mode) is used.
*3 : For the Redundant PLC, access is disabled.
*4 : partially supported, depends on CPU type

## MELSECNET/10 mode to Q CPU (Q mode)

| Own Board | Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|---|
| | QCPU (Q mode) | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| o | o | MELSECNET/H | x | x | x | x | x |
| | | MELSECNET/10 | o | o | o | o | x |
| | | MELSECNET(II) | x | x | x | x | x |
| | | Ethernet | o | x | x | x | x |
| | | Computer link | *2 | x | o | x | x |
| | | CC-Link | o | x | x | x | x |
| | | CC-Link IE | *3 | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU
*2 : For the Redundant PLC, access is disabled
*3 : partially supported, depends on CPU type

## MELSECNET/10 mode to Q CPU (A mode) and A CPU

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| Own Board | Connected Station CPU | | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|---|---|
| | QCPU (A mode) | ACPU *1 | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| o | o | o | MELSECNET/H | x | x | x | x | x |
| | | | MELSECNET/10 | o | o | o | o | x |
| | | | MELSECNET(II) | x | x | x | x | x |
| | | | Ethernet | x | x | x | x | x |
| | | | Computer link | x | x | x | x | x |
| | | | CC-Link | x | x | x | x | x |
| | | | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU

### MELSECNET/10 mode to QnA CPU

| Own Board | Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|---|
| | QnACPU | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| o | o | MELSECNET/H | x | x | x | x | x |
| | | MELSECNET/10 | o | o | o | o | x |
| | | MELSECNET(II) | x | x | x | x | x |
| | | Ethernet | x | x | o | x | x |
| | | Computer link | x | x | o | x | x |
| | | CC-Link | x | x | x | x | x |
| | | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU

#### 9.3.2.10 PC MELSECNET/10 Board

A connection between PC and PLC via MELSECNET/10 requires the MELSECNET/10 interface board and the corresponding driver to be installed in the PC.

## PC side MELSECNET/10 parameters

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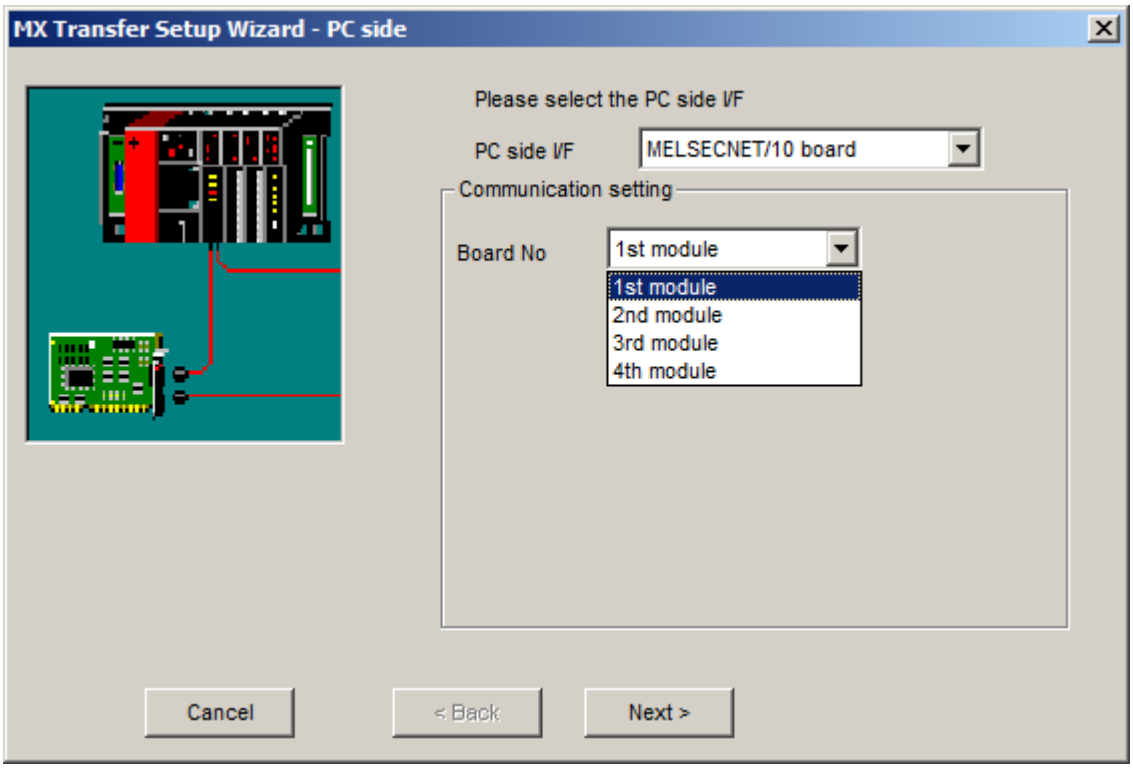
| Parameter | Values | Description |
|---|---|---|
| Board No. | 1st, 2nd, 3rd, 4th module | selects the interface board in the PC |




For a description of the editable parameters on the page see PC side MELSECNET/10 parameters.
The PLC station, to which a connection is established, can be either

- the host station
- a different station in an attached network
- a different station in a separate network

## Q CPU (Q mode)

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| Own Board | Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|---|
| | QCPU (Q mode) | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| o | o | MELSECNET/H | o | x | x | x | x |
| | | MELSECNET/10 | o | o | o | o | x |
| | | MELSECNET(II) | x | x | x | x | x |
| | | Ethernet | o | x | x | o | x |
| | | Computer link | *2 | x | o | x | x |
| | | CC-Link | o | x | x | x | o |
| | | CC-Link IE | *3 | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU
*2 : For the Redundant PLC, access is disabled
*3 : partially supported, depends on CPU type

## Q CPU (A mode) and A CPU

| Own Board | Connected Station CPU | | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|---|---|
| | QCPU (A mode) | ACPU *1 | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| o | o | o | MELSECNET/H | x | x | x | x | x |
| | | | MELSECNET/10 | o | o | o | o | x |
| | | | MELSECNET(II) | x | x | x | x | x |
| | | | Ethernet | x | x | x | x | x |
| | | | Computer link | x | x | x | x | x |
| | | | CC-Link | x | o | x | x | x |
| | | | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU

## QnA CPU

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| Own Board | Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|---|
| | QnACPU | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| o | o | MELSECNET/H | x | x | x | x | x |
| | | MELSECNET/10 | o | o | o | o | x |
| | | MELSECNET(II) | x | x | x | x | x |
| | | Ethernet | x | x | o | x | x |
| | | Computer link | x | x | o | x | x |
| | | CC-Link | x | o | x | x | x |
| | | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU

#### 9.3.2.11 PC CC-Link IE Field Board

A connection between PC and PLC via CC-Link IE Field requires the CC-Link IE Field interface board and the corresponding driver to be installed in the PC.

## PC side CC-Link IE Field parameters

| Parameter | Values | Description |
|---|---|---|
| Board No. | 1st, 2nd, 3rd, 4th module | selects the interface board in the PC |

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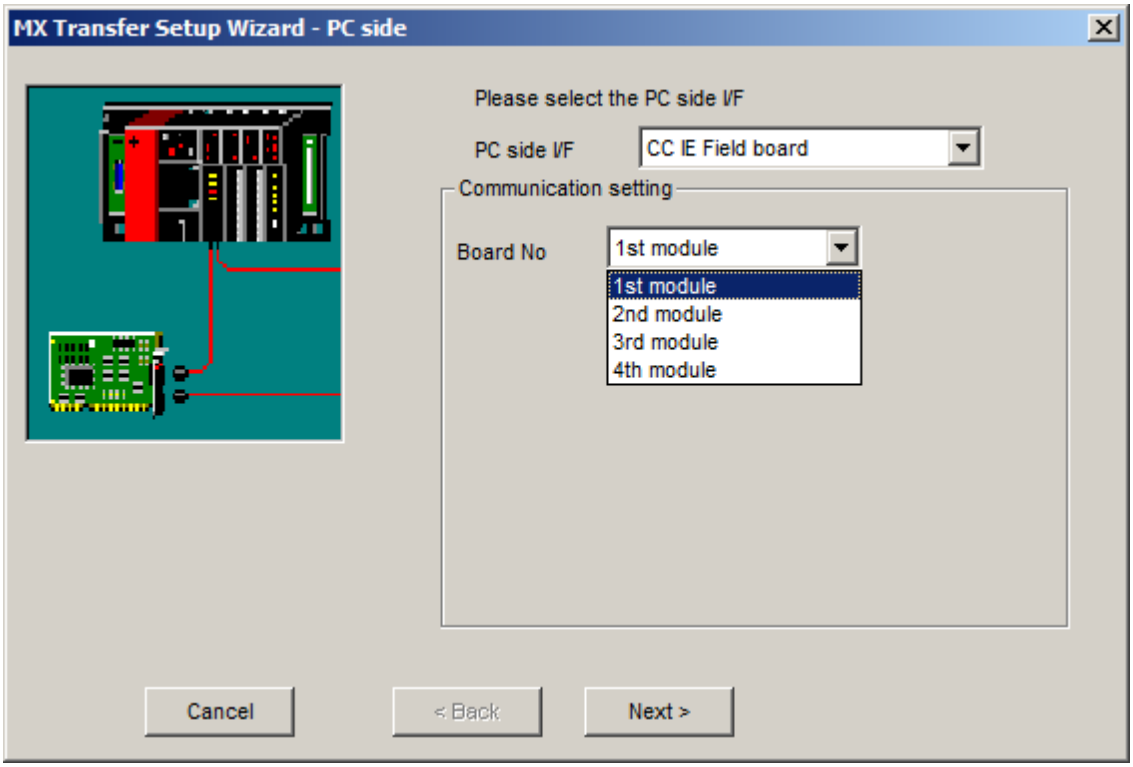


For a description of the editable parameters on the page see PC side CC-Link IE parameters.
The PLC station, to which a connection is established, can be either

- the host station
- a different station in an attached network
- a different station in a separate network

#### 9.3.2.12 PC CC-Link Board

A connection between PC and PLC via CC-Link requires the CC-Link interface board and the corresponding driver to be installed in the PC.

## PC side CC-Link parameters

| Parameter | Values | Description |
|---|---|---|
| Board No. | 1st, 2nd, 3rd, 4th module | selects the interface board in the PC |

**Note:**
The CC-Link master/local module used in CC-Link communication or CC-Link G4 communication (only when the AJ65BT-G4 is used), must have software version 'N' or later. Modules with software version 'M' or earlier will not operate properly.

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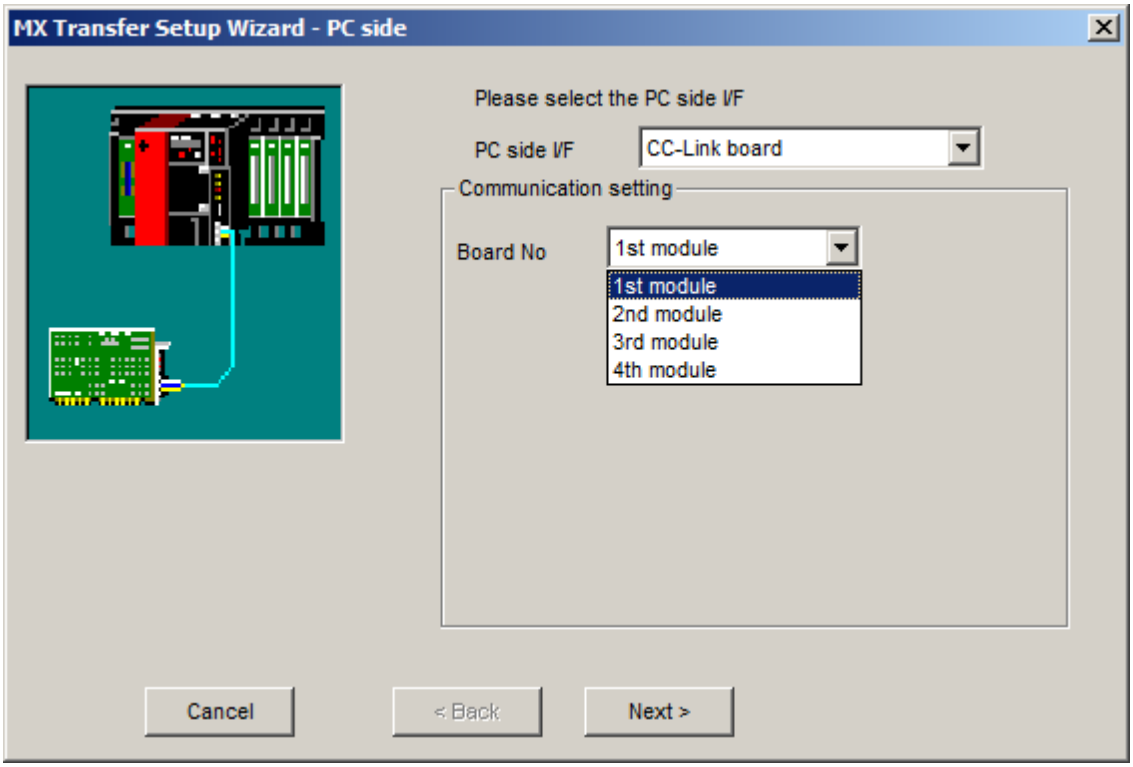


For a description of the editable parameters on the page see PC side CC-Link parameters.
The PLC station, to which a connection is established, can be either

- the host station
- a different station in an attached network
- a different station in a separate network

## Q CPU (Q mode)

| Own Board | Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|---|
| | QCPU (Q mode) | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| o | o | MELSECNET/H | o | x | x | x | x |
| | | MELSECNET/10 | o | x | x | x | x |
| | | MELSECNET(II) | x | x | x | x | x |
| | | Ethernet | o | x | x | x | x |
| | | Computer link | x | x | x | x | x |
| | | CC-Link | x | x | x | x | x |
| | | CC-Link IE | *2 | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU
*2 : partially supported, depends on CPU type

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### Q CPU (A mode)

| Own Board | Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|---|
| | QCPU (A mode) | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| o | o | MELSECNET/H | x | x | x | x | x |
| | | MELSECNET/10 | x | x | x | x | x |
| | | MELSECNET(II) | x | x | x | x | x |
| | | Ethernet | x | x | x | x | x |
| | | Computer link | x | x | x | x | x |
| | | CC-Link | x | x | x | x | x |
| | | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU

### QnA CPU

| Own Board | Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|---|
| | QnACPU | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| o | o | MELSECNET/H | x | x | x | x | x |
| | | MELSECNET/10 | x | x | o | x | x |
| | | MELSECNET(II) | x | x | x | x | x |
| | | Ethernet | x | x | o | x | x |
| | | Computer link | x | x | x | x | x |
| | | CC-Link | x | x | x | x | x |
| | | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU

### A CPU

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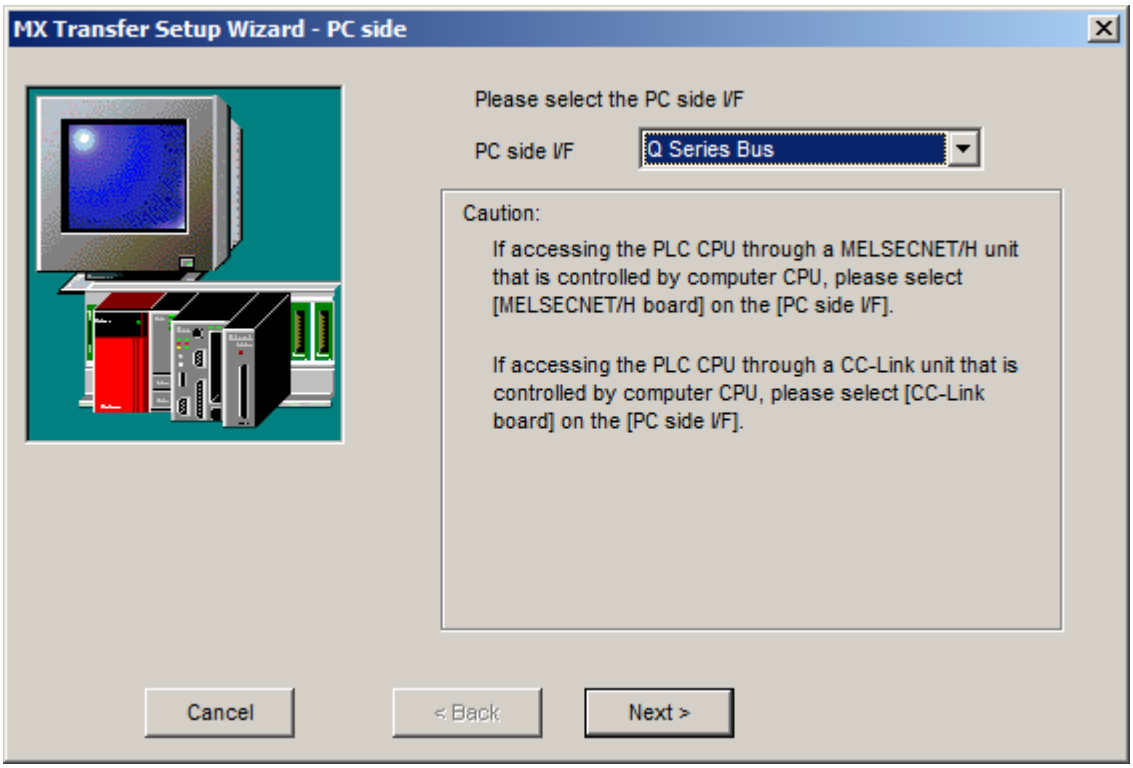
| Own Board | Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|---|
| | ACPU *1 | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| o | o | MELSECNET/H | x | x | x | x | x |
| | | MELSECNET/10 | x | x | x | x | x |
| | | MELSECNET(II) | x | x | x | x | x |
| | | Ethernet | x | x | x | x | x |
| | | Computer link | x | x | x | x | x |
| | | CC-Link | x | x | x | x | x |
| | | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU

### 9.3.2.13 PC Q Series Bus

Configure a connection from the PC CPU module installed in a Q series rack to a PLC CPU within the same rack, using the back panel bus. Alternatively the communication between PC CPU and PLC CPU module can use a MELSECNET/H or a CC-Link interface.


MX Transfer Setup Wizard - PC side
Please select the PC side I/F
PC side I/F
Q Series Bus
Caution:
If accessing the PLC CPU through a MELSECNET/H unit that is controlled by computer CPU, please select [MELSECNET/H board] on the [PC side I/F].
If accessing the PLC CPU through a CC-Link unit that is controlled by computer CPU, please select [CC-Link board] on the [PC side I/F].
Cancel
< Back
Next >

Pressing the <**Next**> button opens a page for selecting the connected CPU type.

## Q Series Bus - Network

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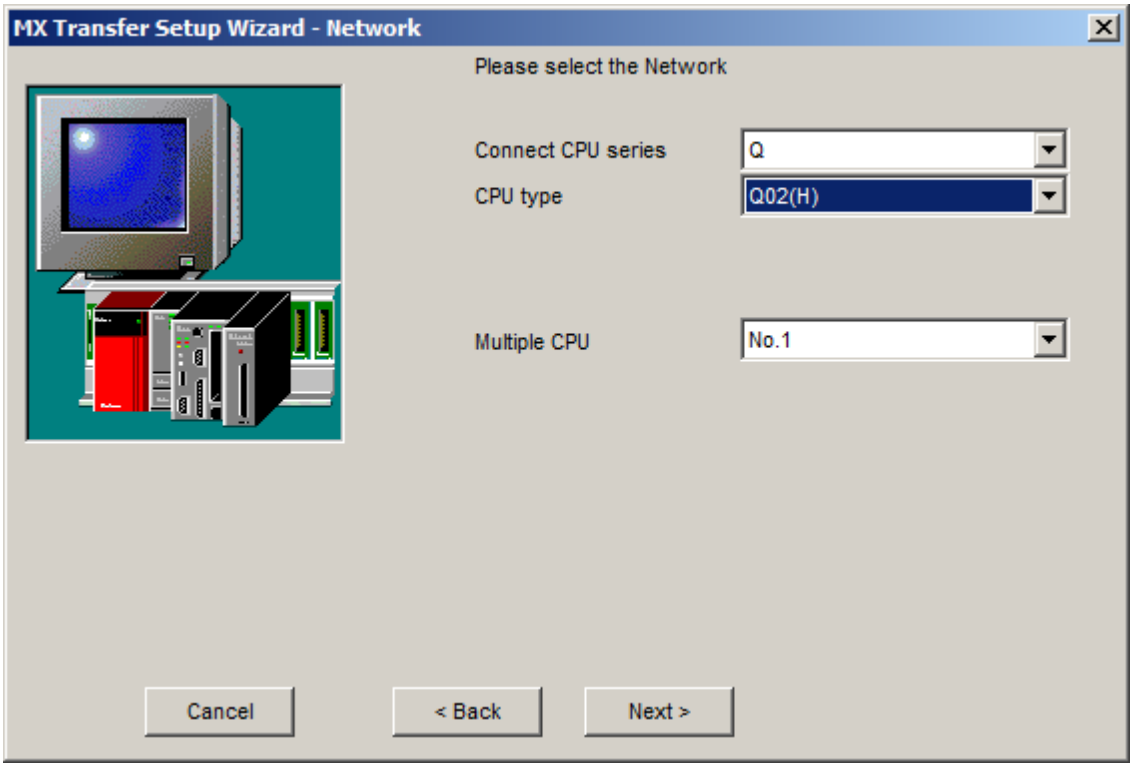
| Parameter | Values | Description |
|---|---|---|
| CPU type | see list of supported CPU types | type of PLC CPU module |
| Multiple CPU | No. 1, No. 2, No. 3 | selects the CPU module in the PLC |




Pressing the <**Next**> button opens a page for entering a comment for the connection.

#### 9.3.2.14 PC GX Simulator

Define a connection to an instance of GX Simulator running on the same computer.

## PC side GX Simulator parameters

| Parameter | Values | Description |
|---|---|---|
| Station type | 'Host station' or 'Other station' | direct connection or MELSECNET network |
| CPU series | Q, QnA, A, FX | series of the CPU type selected in GX Simulator<br>(FX is only available for station type 'Host station') |
| CPU type | see list of supported CPU types | type of CPU selected in GX Simulator **not selectable for 'Other station' as 'Station type'** |
| Network No | 1 - 239 | network number of the E71 ethernet module, the PC is connected to. The E71 network number is configured in the 'Network Parameters' of the PLC settings. |

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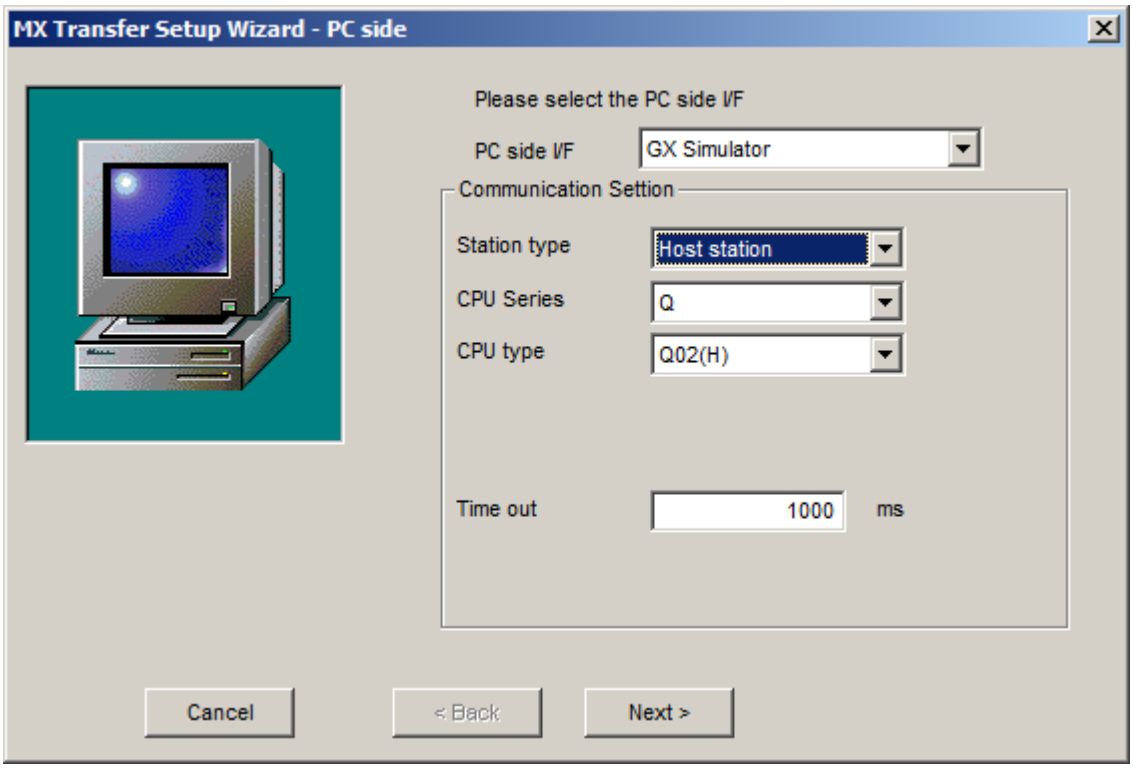
| Parameter | Values | Description |
|---|---|---|
| | | **only for 'Other station' as 'Station type'** |
| Station No. | 1 - 64 | station number of the PC side interface. This number can be freely chosen, but must be unique within the network specified by the network number.<br>**only for 'Other station' as 'Station type'** |
| Time out | 1 - 2147483647 | communication timeout in milliseconds |

| | |
|---|---|
| | **Note:**<br>Before configuring the connection please make sure that GX Simulator and GX Developer are operating.<br>In addition, do not terminate GX Simulator and GX Developer while the user program is running.<br>If you do so, you will not be able to terminate the user program normally. |

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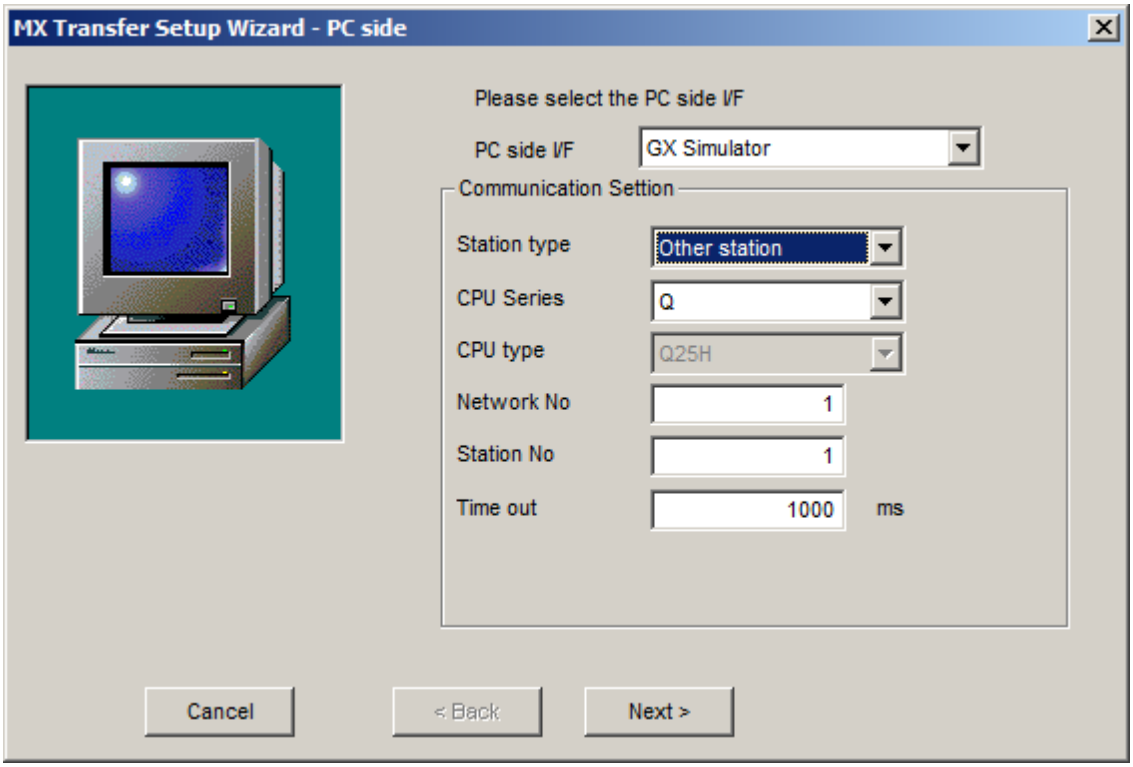


For a description of the editable parameters on the page see PC side GX Simulator parameters.
Pressing the <**Next**> button opens a page for entering a comment for the connection.

### 9.3.2.15 PC GX Simulator2

Define a connection to an instance of GX Simulator2 running on the same computer.

## PC side GX Simulator2 parameters

| Parameter | Values | Description |
|---|---|---|
| Target simulator | • None<br>• Simulator A<br>• Simulator B<br>• Simulator C<br>• Simulator D | simulator instance to connect to (for FX series projects at present only one simulation can be executed at a time)<br>if the simulation is currently running, pressing the 'Browse' button opens the 'Find GX Simulator2 Runtime' dialog to view additional information of the available targets, e.g. the GXW2 project name |
| CPU series | Q, L, FX | series of the CPU type selected in GX Simulator2 |

**Note:**
Before configuring the connection please make sure that GX Simulator2 is operating. In addition, do not terminate GX Simulator2 while the user program is running. If you do so, you will not be able to terminate the user program normally.

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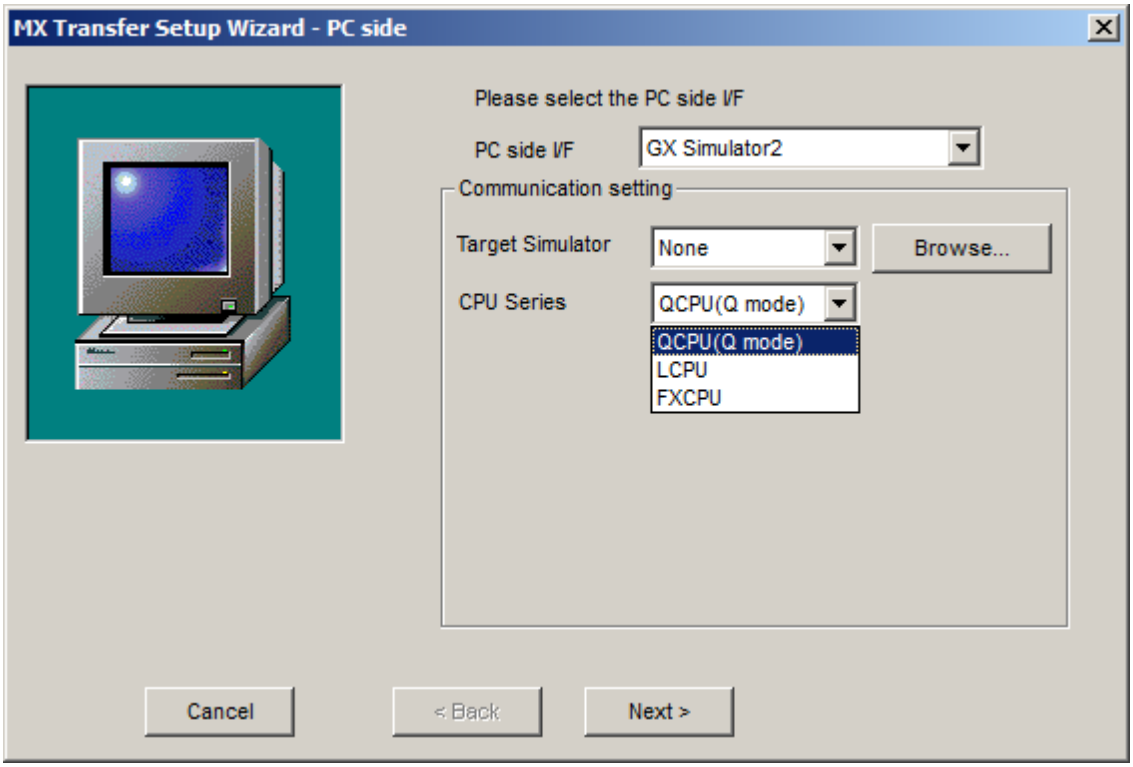
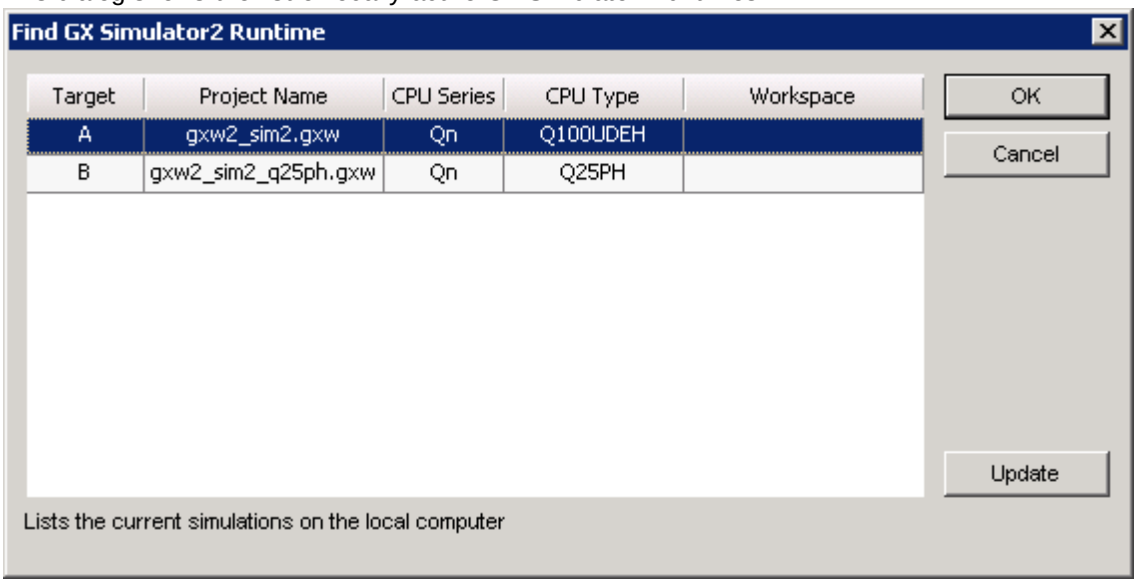



For a description of the editable parameters on the page see PC side GX Simulator2 parameters.
Pressing the <**Next**> button opens a page for entering a comment for the connection.

## 'Find GX Simulator2 Runtime' Dialog

This dialog shows the list of locally active GX Simulator2 runtimes.




For each runtime the following items are displayed:

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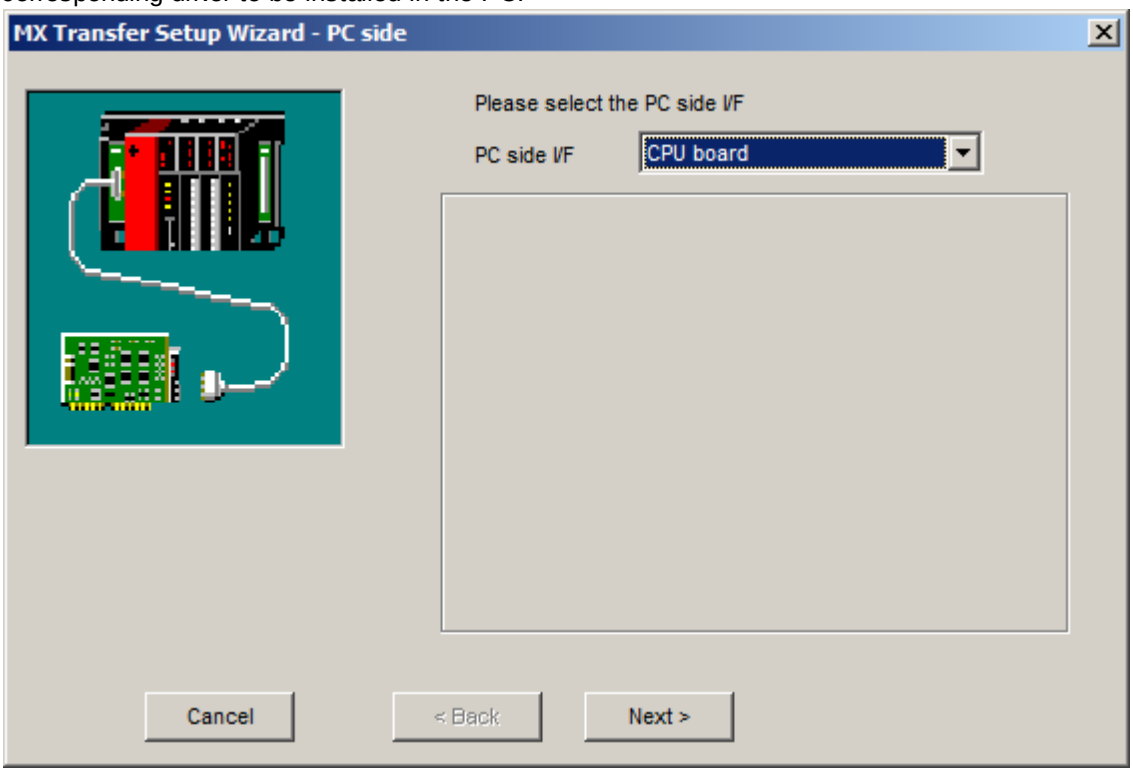
| Column | Description |
|---|---|
| Target | marks the instance of the runtime, if multiple runtimes are active |
| Project Name | file name of the GXW2 project |
| CPU Series | family of the CPU type set in the GXW2 project |
| CPU Type | CPU type set in the GXW2 project |
| Workspace | the GXW2 workspace of the project, if it is part of a workspace |

The table contents are not automatically refreshed, when a runtime is started or stopped. To update the list of runtimes press the <**Update**> button.
Pressing <**OK**> sets the 'Target Simulator' selection in the transfer setup wizard to the simulation, which has been selected in the table.

#### 9.3.2.16 PC CPU Board

A connection between PC and PLC using a CPU board requires the CPU board and the corresponding driver to be installed in the PC.




The PLC station, to which a connection is established, can be either
- the host station
- a different station in an attached network

#### 9.3.2.17 PLC CPU Interface

Enter the settings for the serial interface of a PLC CPU module.

## PLC side CPU interface parameters

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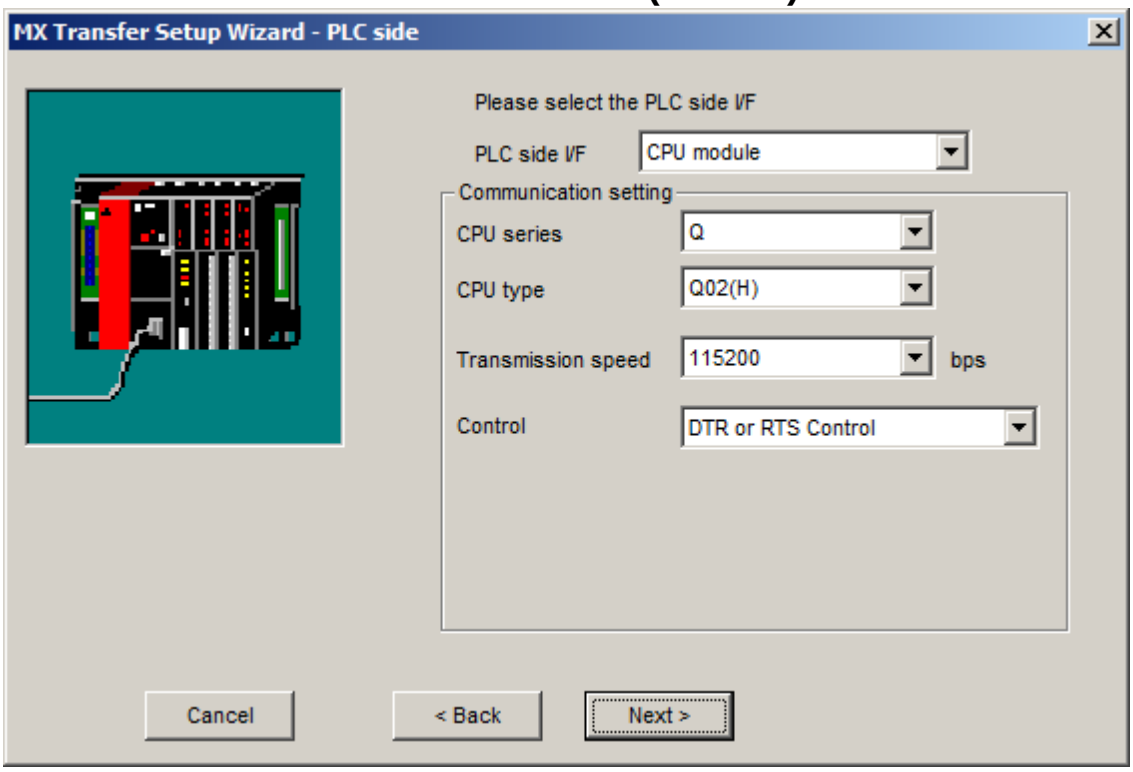
| Parameter | Values | Description |
|---|---|---|
| CPU series | Q, QnA, A, FX, L | series of the CPU type selected in serial PC side interface |
| CPU type | see list of supported CPU types | type of PLC CPU module |
| Transmission speed | 300 - 115200 | baudrate on the serial link |
| Control | DTR only, RTS only, DTR and RTS, DTR or RTS | handshake signals |

**Note for Q00J/Q00/Q01 CPUs:**
If the baudrate set in the PC differs from the baudrate in the CPU module, the actual baudrate is fixed at 9600 bps. To increase the communication speed, match the personal computer side transmission speed with the Q00J/Q00/Q01CPU side transmission speed.

**Supported transmission speeds:**
As the transmission speed of the QCPU(Q mode) and QCPU(A mode), you can set 9600bps, 19200bps, 38400bps, 57600bps or 115200bps.
For the QnACPU of version 9707B or later, you can set the transmission speed of 9600bps, 19200bps or 38400bps.
For the QnACPU of other versions, you can set 9600bps or 19200bps.
The transmission speeds of the ACPU (except A2USHCPU-S1), FXCPU and motion controller CPU are fixed to 9600bps. (The A2USHCPU-S1 may be set to 19200bps.)

## PLC CPU Standard Serial Interface (RS 422)

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For a description of the editable parameters on the page see PLC side CPU interface parameters. Pressing the <**Next**> button opens a page for entering a comment for the connection.

## Q CPU (Q mode)

| Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|
| QCPU (Q mode) | | QCPU (Q mode) | QCPU (A mode) | QnA CPU | ACPU *1 | FXCPU |
| | MELSECNET/H | o | x | x | x | x |
| | MELSECNET/10 | o | o | o | o | o |
| | MELSECNET(II) | x | x | x | x | x |
| | Ethernet | o | x | o | x | x |
| | Computer link | *3 | x | o | x | x |
| | CC-Link | o | *2 | *2 | *2 | x |
| | CC-Link IE | *4 | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU
*2 : Use the QnA or ACPU side CC-Link module whose ROM version is "S" or later
*3 : For the Redundant PLC, access is disabled
*4 : partially supported, depends on CPU type

## Q CPU (A mode)

| Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|
| QCPU (A mode) | | QCPU (Q mode) | QCPU (A mode) | QnA CPU | ACPU *1 | FXCPU |
| | MELSECNET/H | x | x | x | x | x |
| | MELSECNET/10 | x | o | x | o | x |
| | MELSECNET(II) | x | o | x | o | x |
| | Ethernet | x | x | x | x | x |
| | Computer link | x | x | x | x | x |
| | CC-Link | x | x | x | x | x |
| | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU

## QnA CPU

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| Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|
| QnACPU | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| | MELSECNET/H | x | x | x | x | x |
| | MELSECNET/10 | x | x | o | x | o |
| | MELSECNET(II) | x | x | o | x | x |
| | Ethernet | x | x | o | x | x |
| | Computer link | x | x | o | x | x |
| | CC-Link | x | x | x | x | x |
| | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU

### A CPU

| Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|
| ACPU *1 | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| | MELSECNET/H | x | x | x | x | x |
| | MELSECNET/10 | x | o | x | o | x |
| | MELSECNET(II) | x | o | x | o | x |
| | Ethernet | x | x | x | x | x |
| | Computer link | x | x | x | x | x |
| | CC-Link | x | x | x | x | x |
| | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU

### FX CPU

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| Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|
| FXCPU | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| | MELSECNET/H | x | x | x | x | x |
| | MELSECNET/10 | x | x | x | x | x |
| | MELSECNET(II) | x | x | x | x | x |
| | Ethernet | x | x | x | x | x |
| | Computer link | x | x | x | x | x |
| | CC-Link | x | x | x | x | x |
| | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU

## PLC CPU Universal Serial Bus Interface (USB)

## PLC side CPU USB interface parameters

| Parameter | Values | Description |
|---|---|---|
| CPU series | Q, FX, L | series of the CPU type |
| CPU type | see list of supported CPU types | type of PLC CPU module |

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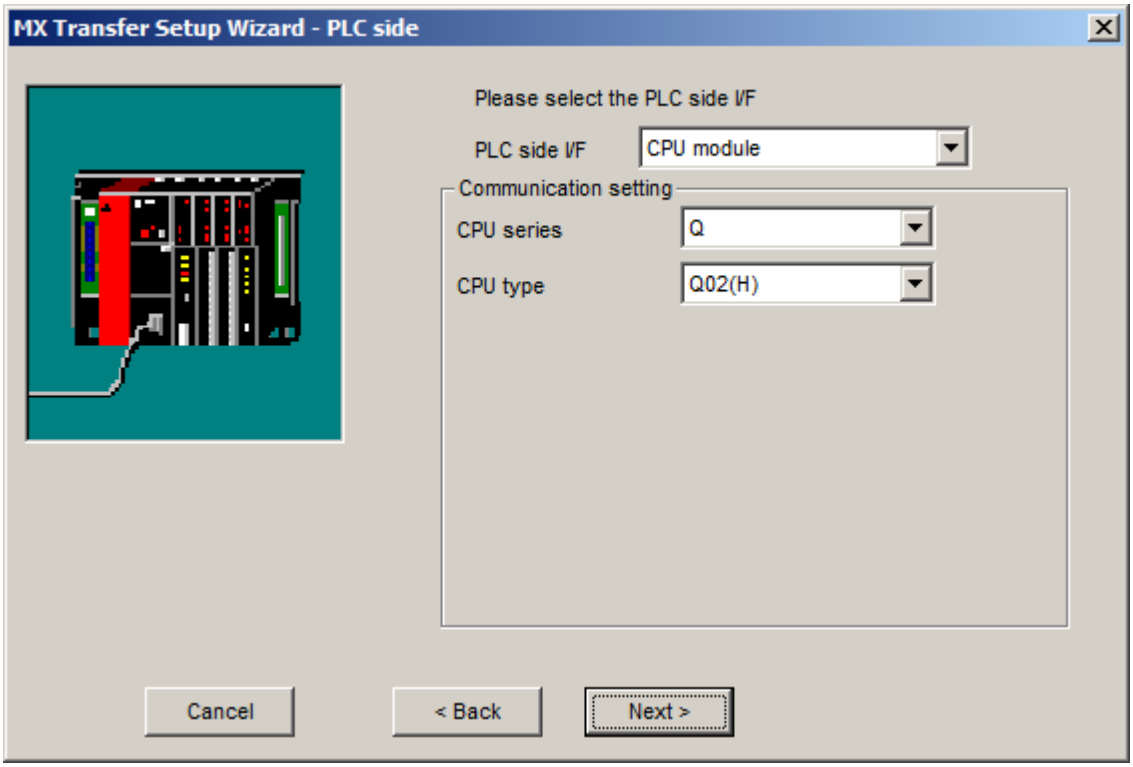


For a description of the editable parameters on the page see PLC side CPU USB interface parameters.
Pressing the <**Next**> button opens a page for entering a comment for the connection.

## Q CPU (Q mode)

| Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|
| QCPU (Q mode) | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| | MELSECNET/H | o | x | x | x | x |
| | MELSECNET/10 | o | o | o | o | x |
| | MELSECNET(II) | x | x | x | x | x |
| | Ethernet | o | x | o | x | x |
| | Computer link | *3 | x | o | x | x |
| | CC-Link | o | *2 | *2 | *2 | x |
| | CC-Link IE | | | | | |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU
*2 : Use the QnA or ACPU side CC-Link module whose ROM version is "S" or later
*3 : For the Redundant PLC, access is disabled

**Warning:**

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| | |
|---|---|
| | Frequently disconnecting/reconnecting the USB cable or resetting or powering ON/OFF the PLC CPU during communications with the PLC CPU may cause a communication error which cannot be recovered.<br>If it is not recovered, completely disconnect the USB cable once and then reconnect it after 5 or more seconds have elapsed. |

## PLC Ethernet CPU

Please see PLC Ethernet Interface.

### 9.3.2.18 PLC C24 Interface

Enter the settings for a serial interface module in the PLC.

## PLC side C24 module parameters

| Parameter | Values | Description |
|---|---|---|
| Module type | AJ71C24, AJ71UC24, AJ71QC24, QJ71C24, LJ71C24 | type of PLC C24 module |
| Station No. | 1 - 64 | station number of the PC side interface. This number can be freely chosen, but must be unique within the network specified by the network number. |
| Transmission speed | 300 - 115200 | baudrate on the serial link |
| Parity | Odd, None, Even | parity |
| Data bit | 7, 8 | number of data bits in a byte<br>**only for AJ71C24 and AJ71UC24** |
| Stop bit | 1, 2 | number of stop bits<br>**only for AJ71C24 and AJ71UC24** |
| Sum check | Existence, None | enable/disable sumcheck<br>**only for AJ71C24 and AJ71UC24** |
| Control | DTR only, RTS only, DTR and RTS, DTR or RTS | handshake signals |

**Note:**
In any connection form (direct coupling, relaying), where the target station of the UC24 or C24 is the QnACPU, an error is returned, if clock data read/write is executed.

## AJ71C24 / AJ71UC24

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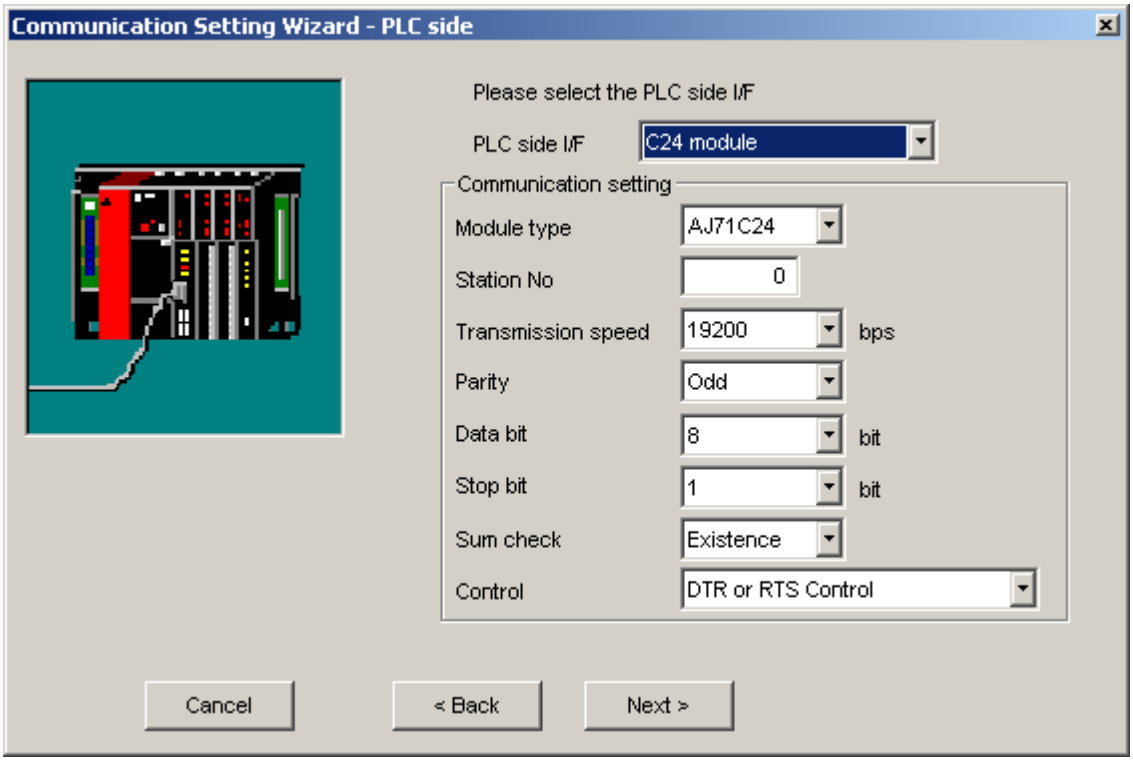


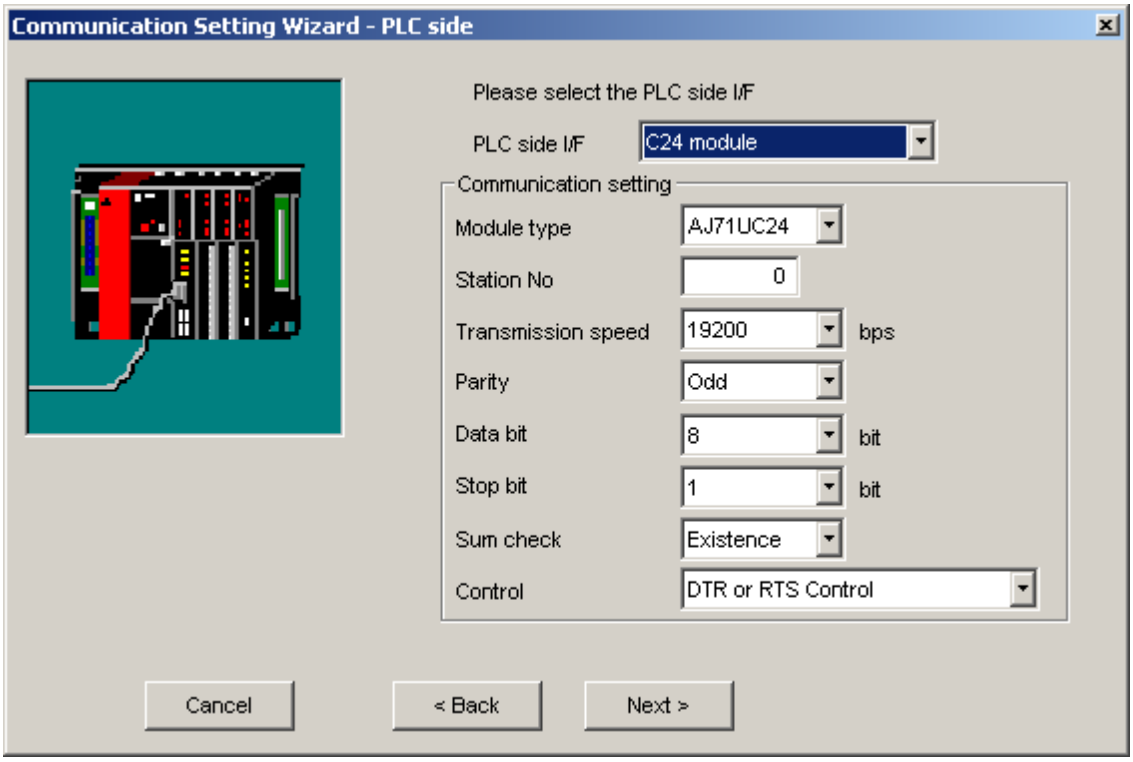


For a description of the editable parameters on the page see PLC side C24 module parameters.
Pressing the <Next> button opens a page for specifying an optional additional network layer.

**Note:**
If the connected station CPU is the AnUCPU and the computer link module is the UC24 for computer link connection, remote operation will result in an error when access is made to the AnNCPU, AnACPU or QnACPU via the MELSECNET/10.

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| Connected Station CPU | | | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|---|---|
| QCPU (A mode) | QnACPU | ACPU *1 | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| | *2 | | MELSECNET/H | x | x | x | x | x |
| | | | MELSECNET/10 | x | o | *2 | o | x |
| | | | MELSECNET(II) | x | o | *2 | o | x |
| | | | Ethernet | x | x | x | x | x |
| | | | Computer link | x | x | x | x | x |
| | | | CC-Link | x | x | x | x | x |
| | | | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU
*2 : Operates as the one equivalent to AnACPU

| Switch *1 | | Settings | | |
|---|---|---|---|---|
| | | For 1:1 communication | For 1:n communication | |
| | | | Module 1) | Module 2) |
| Mode setting switch | | 1 (format 1) | A (format 1) | 5 (format 1) |
| Station number setting switches | | 0 | As set by user | |
| Transmission specifications setting switches | Main channel setting | OFF (RS-232) | OFF (RS-232) | ON (RS-422) |
| | Data bit setting | As set by user | As set by user *2 | |
| | Transmission speed setting | As set by user | As set by user *2 | |
| | Parity bit yes/no setting | As set by user | As set by user *2 | |
| | Stop bit setting | As set by user | As set by user *2 | |
| | Sum check yes/no setting | As set by user | As set by user *2 | |
| | Online change enable/ disable setting | As set by user | | |
| | Computer link/multidrop setting | ON (computer link) | ON (computer link) | ON (computer link) |

*1: For switch numbers, refer to the computer link module manual.
*2: Make the same settings to Module 1 and Module 2.

## AJ71QC24

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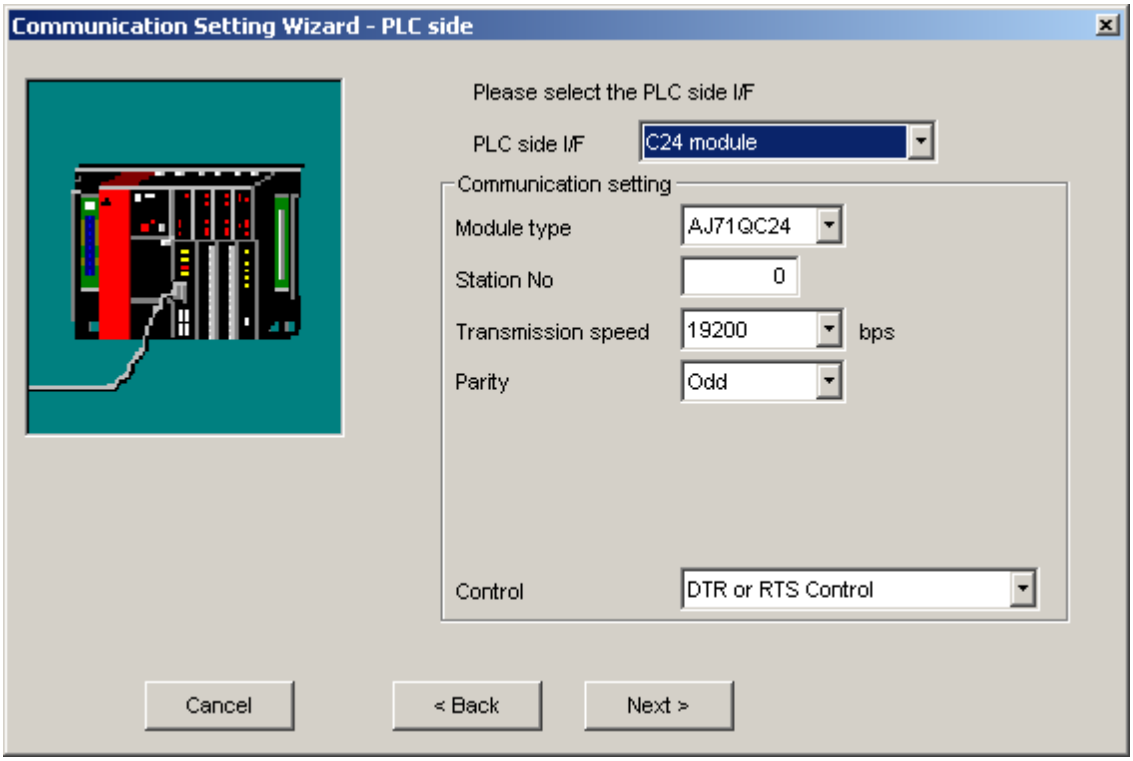


For a description of the editable parameters on the page see PLC side C24 module parameters.
Pressing the <Next> button opens a page for specifying an optional additional network layer.

**Note:**
For the QC24, note that the illegal case of specifying the first I/O number of a nonexisting module and reading/writing U \G will not return an error if the software version of the module is 'k" or earlier.

With AJ71QC24-R2, A1SJ71QC4-R2, AJ71QC24N-R2 or A1SJ71QC24N-R2 modules only CH1 can be used.

| Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|
| QnACPU | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| | MELSECNET/H | x | x | x | x | x |
| | MELSECNET/10 | x | x | o | x | x |
| | MELSECNET(II) | x | x | o | x | x |
| | Ethernet | x | x | o | x | x |
| | Computer link | x | x | o | x | x |
| | CC-Link | x | x | o | x | x |
| | CC-Link IE | x | x | x | x | x |

o: Accessible

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x: Inaccessible
*1 : Including motion controller CPU

| Switch (Switch Number) | | Settings | | | | | |
|---|---|---|---|---|---|---|---|
| | | For 1:1 communication | | For 1:n communication | | | |
| | | | | Module 1) | | Module 2) | |
| | | CH1 side | CH2 side | CH1 side | CH2 side | CH1 side | CH2 side |
| Mode setting switch | | 5 (format 5) | | 0 or 5 (format 5) | 5 (format 5) | 5 (format 5) | |
| Station number setting switch | | 0 | | As set by user | | | |
| Transmission specifications setting switches | Operation setting switch (SW01) | OFF (independent operation) | | OFF (independent operation) | ON or OFF *1 | OFF (independent operation) | |
| | Data bit setting (SW02) | ON (8 bit) | | | | | |
| | Parity bit yes/no setting (SW03) | As set by user | | As set by user *2 | | | |
| | Even parity/odd parity setting (SW04) | As set by user | | As set by user *2 | | | |
| | Stop bit setting (SW05) | OFF (1 bit) | | | | | |
| | Sum check yes/no setting (SW06) | ON (yes) | | | | | |
| | Online change enable/disable setting (SW07) | As set by user | | | | | |
| | Setting change enable/disable setting (SW08) | As set by user | | As set by user *2 | | | |
| | Transmission speed setting (SW09 to SW12) | As set by user | | As set by user *2 | | | |
| | — (SW13 to SW15) | All OFF | | | | | |

*1: Set to ON if the CH1 side mode setting switch setting is 0 or to OFF if the setting is 5 (format 5).
*2: Make the same settings to Module 1 and Module 2.

## QJ71C24

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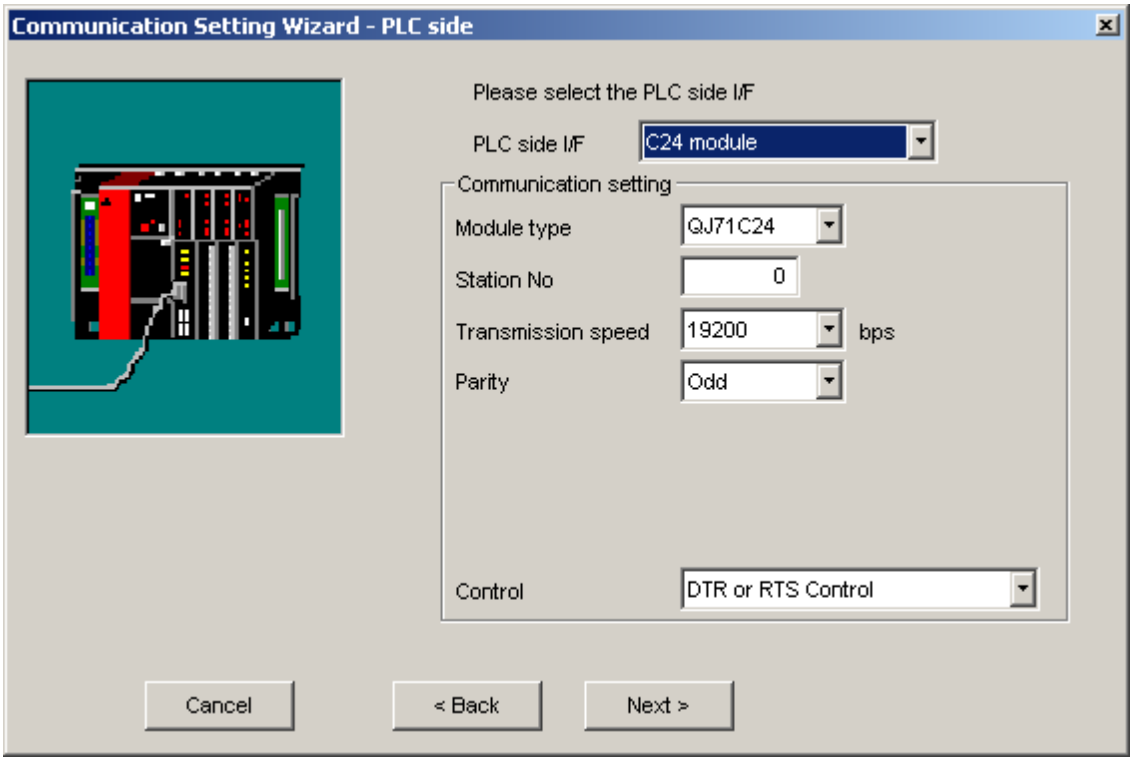


For a description of the editable parameters on the page see PLC side C24 module parameters.
Pressing the <Next> button opens a page for specifying an optional additional network layer.

| | |
|---|---|
| | **Note:**<br>When QJ71C24-R2 of function version A is used, only either of CH1 and CH2 can be used.<br>When the MELSOFT product, such as GX Developer or GOT, is using one channel, the application cannot use the other channel.<br>When the QJ71C24-R2 of function version B is used, the application can use both channels. |

| Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|
| QCPU (Q mode) | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| | MELSECNET/H | o | x | x | x | x |
| | MELSECNET/10 | o | o | o | o | x |
| | MELSECNET(II) | x | x | x | x | x |
| | Ethernet | o | x | o | x | x |
| | Computer link | *2 | x | o | x | x |
| | CC-Link | o | o | o | o | x |
| | CC-Link IE | *2 | x | x | x | x |

o: Accessible

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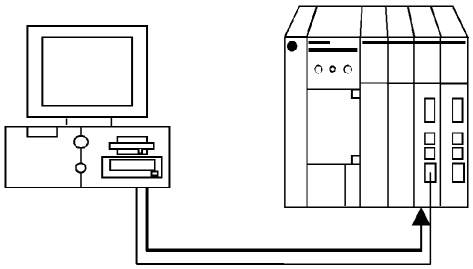
x: Inaccessible
*1 : Including motion controller CPU
*2 : For the Redundant PLC, access is disabled

(a) For 1:1 communication



| Item | Settings | | Set Value |
|---|---|---|---|
| | b15 to b8 | b7 to b0 | |
| Switch 1 | CH1 communication speed | CH1 transmission setting *1 | 0000H |
| Switch 2 | — | CH1 communications protocol | 0000H |
| Switch 3 | CH2 communication speed | CH2 transmission setting *1 | 0000H |
| Switch 4 | — | CH2 communications protocol | 0000H |
| Switch 5 | Module station number | | 0000H |

*1: Settings of CH1 and CH2 are indicated below .

| Bit | Description | CH1 transmission setting | CH2 transmission setting |
|---|---|---|---|
| b0 | Operation setting | 0 (independent) | 0 (independent) |
| b1 | Data bit | 0 (7) | 0 (7) |
| b2 | Parity bit | 0 (no) *3 | 0 (no) *3 |
| b3 | Odd/even parity | 0 (odd) *3 | 0 (odd) *3 |
| b4 | Stop bit | 0 (1) | 0 (1) |
| b5 | Sum check code | 0 (no) | 0 (no) |
| b6 | Online change *2 | 0 (disable) | 0 (disable) |
| b7 | Setting change | 0 (disable) | 0 (disable) |

*2: When the communication protocol is set to GX Developer connection (0H), the online change bit (b6) setting is made invalid to enable online change regardless of the online change setting.
*3: Set the followings to odd:
"Parity bit" of the communication setting utility/"ActParity" of the ActQJ71C24 control property.

Setting CH1/CH2 communication protocol to GX Developer connection (0H) makes the communication speed/transmission settings to 0H (all OFF).
Refer to the Q series-compatible C24 manual for details.

(b) For 1:n communication

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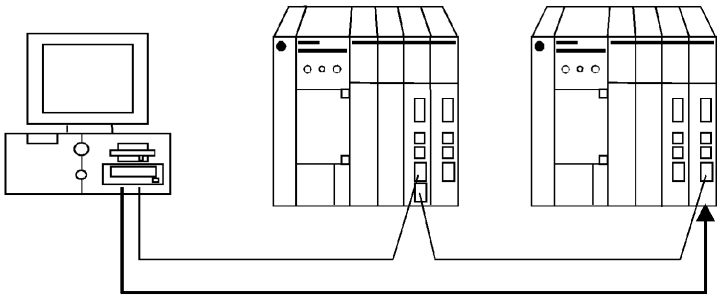

Module 1)

| Item | Settings | | Set Value |
|---|---|---|---|
| | b15 to b8 | b7 to b0 | Synchronous operation |
| Switch 1 | CH1 communication speed | CH1 transmission setting *1 | 0726H |
| Switch 2 | — | CH1 communications protocol | 0008H |
| Switch 3 | CH2 communication speed | CH2 transmission setting *1 | 0727H |
| Switch 4 | — | CH2 communications protocol | 0000H |
| Switch 5 | Module station number | | As set by user |

*1: Settings of CH1 and CH2 are indicated below .

| Bit | Description | Settings Synchronous operation | |
|---|---|---|---|
| | | CH1 transmission setting | CH2 transmission setting |
| b0 | Operation setting | Match to module 2) setting. | |
| b1 | Data bit | Match to module 2) setting. | |
| b2 | Parity bit | Match to module 2) setting. | |
| b3 | Odd/even parity | Match to module 2) setting. | |
| b4 | Stop bit | Match to module 2) setting. | |

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| Bit | Description | Settings Synchronous operation | |
|---|---|---|---|
| | | CH1 transmission setting | CH2 transmission setting |
| b5 | Sum check code | Match to module 2) setting. | |
| b6 | Online change | Match to module 2) setting. | |
| b7 | Setting change | Match to module 2) setting. | |

Module 2)

| Item | Settings | | Set Value |
|---|---|---|---|
| | b15 to b8 | b7 to b0 | Synchronous operation |
| Switch 1 | CH1 communication speed | CH1 transmission setting *1 | 0726H |
| Switch 2 | — | CH1 communications protocol | 0008H |
| Switch 3 | CH2 communication speed | CH2 transmission setting *1 | 0727H |
| Switch 4 | — | CH2 communications protocol | 0000H |
| Switch 5 | Module station number | | As set by user |

*1: Settings of CH1 and CH2 are indicated below .

| Bit | Description | CH1 transmission setting | CH2 transmission setting |
|---|---|---|---|
| b0 | Operation setting | 0 (independent) | 1 (synchronous) |
| b1 | Data bit | 1 (8) | 1 (8) |
| b2 | Parity bit | 1 (yes) | 1 (yes) |
| b3 | Odd/even parity | 0 (odd) | 0 (odd) |
| b4 | Stop bit | 0 (1) | 0 (1) |
| b5 | Sum check code | 1 (yes) | 1 (yes) |
| b6 | Online change *2 | 0 (disable) | 0 (disable) |
| b7 | Setting change | 0 (disable) | 0 (disable) |

*2: When the communication protocol is set to GX Developer connection (0H), the online change bit (b6) setting is

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made invalid to enable online change regardless of the online change setting.
Refer to the Q series-compatible C24 manual for details.

<table>
<tr><td colspan="2" rowspan="3">Switch (Switch Number)</td><td colspan="4">Settings</td></tr>
<tr><td colspan="2">Module 1)</td><td colspan="2">Module 2)</td></tr>
<tr><td>CH1 side</td><td>CH2 side</td><td>CH1 side</td><td>CH2 side</td></tr>
<tr><td colspan="2">Mode setting switch</td><td>0</td><td>5 (format 5)</td><td colspan="2">5 (format 5)</td></tr>
<tr><td colspan="2">Station number setting switches</td><td colspan="2">1</td><td colspan="2">3</td></tr>
<tr><td rowspan="10">Transmission specifications setting switches</td><td>Operation setting switch (SW01)</td><td>OFF (independent operation)</td><td>ON (synchronous operation)</td><td colspan="2">OFF (independent operation)</td></tr>
<tr><td>Data bit setting (SW02)</td><td colspan="2">ON (8 bit)</td><td colspan="2">ON (8 bit)</td></tr>
<tr><td>Parity bit yes/no setting (SW03)</td><td colspan="2">ON (yes)</td><td colspan="2">ON (yes)</td></tr>
<tr><td>Even parity/odd parity setting (SW04)</td><td colspan="2">OFF (odd)</td><td colspan="2">OFF (odd)</td></tr>
<tr><td>Stop bit setting (SW05)</td><td colspan="2">OFF (1 bit)</td><td colspan="2">OFF (1 bit)</td></tr>
<tr><td>Sum check yes/no setting (SW06)</td><td colspan="2">ON (yes)</td><td colspan="2">ON (yes)</td></tr>
<tr><td>Online change enable/ disable setting<br>(SW07)</td><td colspan="2">ON (enable)</td><td colspan="2">ON (enable)</td></tr>
<tr><td>Setting change enable/ disable setting<br>(SW08)</td><td colspan="2">OFF (disable)</td><td colspan="2">OFF (disable)</td></tr>
<tr><td>Transmission speed setting<br>(SW09 to SW12)</td><td colspan="2">19200bps<br><table><tr><th>SW</th><th>Setting</th></tr><tr><td>SW09</td><td>OFF</td></tr><tr><td>SW10</td><td>ON</td></tr><tr><td>SW11</td><td>ON</td></tr><tr><td>SW12</td><td>OFF</td></tr></table></td><td colspan="2">19200bps<br><table><tr><th>SW</th><th>Setting</th></tr><tr><td>SW09</td><td>OFF</td></tr><tr><td>SW10</td><td>ON</td></tr><tr><td>SW11</td><td>ON</td></tr><tr><td>SW12</td><td>OFF</td></tr></table></td></tr>
<tr><td>— (SW13 to SW15)</td><td colspan="2">All OFF</td><td colspan="2">All OFF</td></tr>
</table>

## LJ71C24

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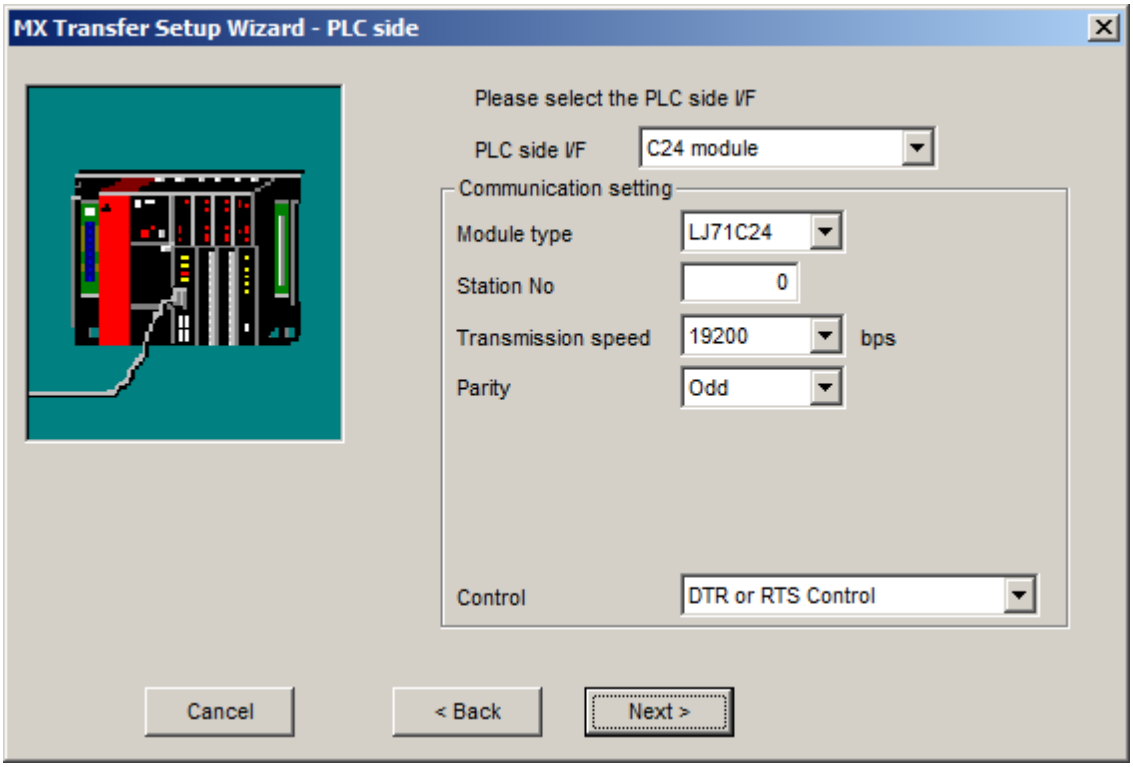


### 9.3.2.19 PLC FX Extended Port

Enter the settings for the serial port of an FX CPU.

## PLC side FX port parameters

| Parameter | Values | Description |
|---|---|---|
| Module type | FX485BD/ADP | type of PLC C24 module |
| Station No. | 0 - 15 | station number of the PLC side interface |
| Transmission speed | 300 - 19200 | baudrate on the serial link |
| Parity | Odd, None, Even | parity |
| Data bit | 7, 8 | number of data bits in a byte |
| Stop bit | 1, 2 | number of stop bits |
| Sum check | Existence, None | enable/disable sumcheck |
| Control | DTR only, RTS only, DTR and RTS, DTR or RTS | handshake signals |
| Transmission wait time | 1 - 65535 | transmission timeout as multiple of 10 milliseconds |

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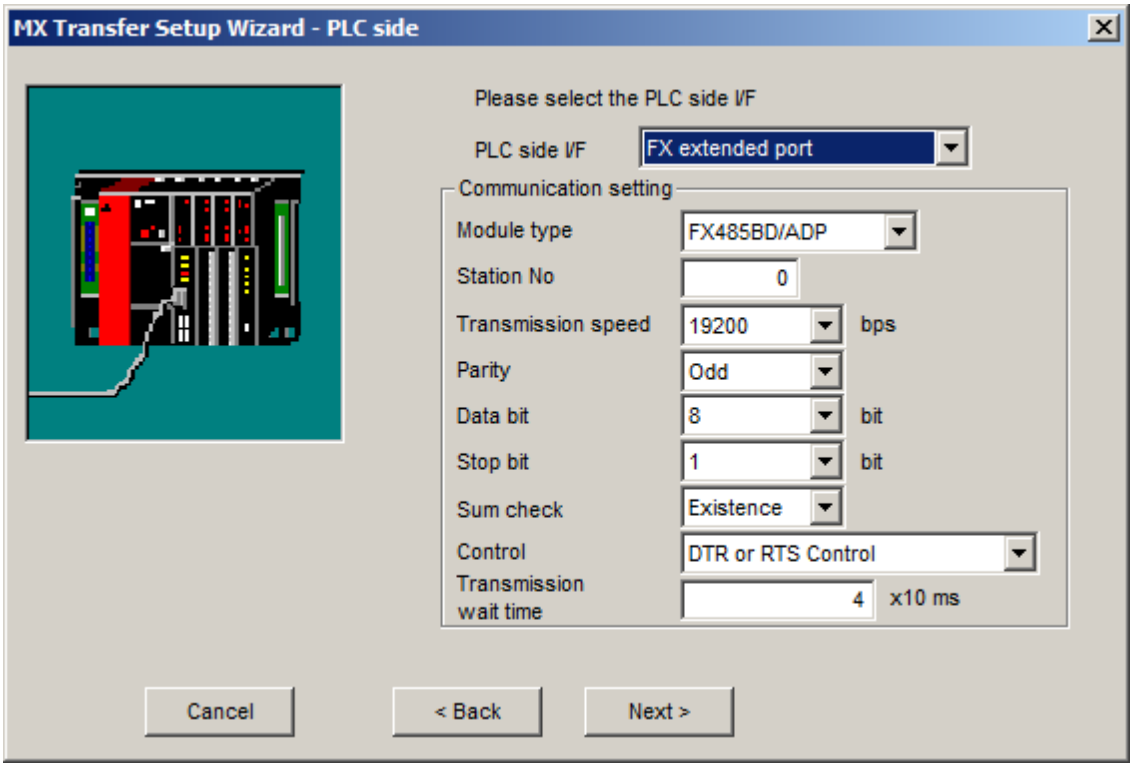
**Note:**
The FX extended port is required when using computer link communication with FX0N, FX1S, FX1N(C), FX2N(C), FX3U(C)CPU.




For a description of the editable parameters on the page see PLC side FX port parameters.
Pressing the <Next> button opens a page for specifying an optional additional network layer.

| Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|
| FXCPU | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| | MELSECNET/H | x | x | x | o | x |
| | MELSECNET/10 | x | x | x | x | x |
| | MELSECNET(II) | x | x | x | x | x |
| | Ethernet | x | x | x | x | x |
| | Computer link | x | x | x | x | o |
| | CC-Link | o | x | x | x | x |
| | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU

Before use the FX extended port must be configured for communication. There are two ways of configuring the FX extended port module:

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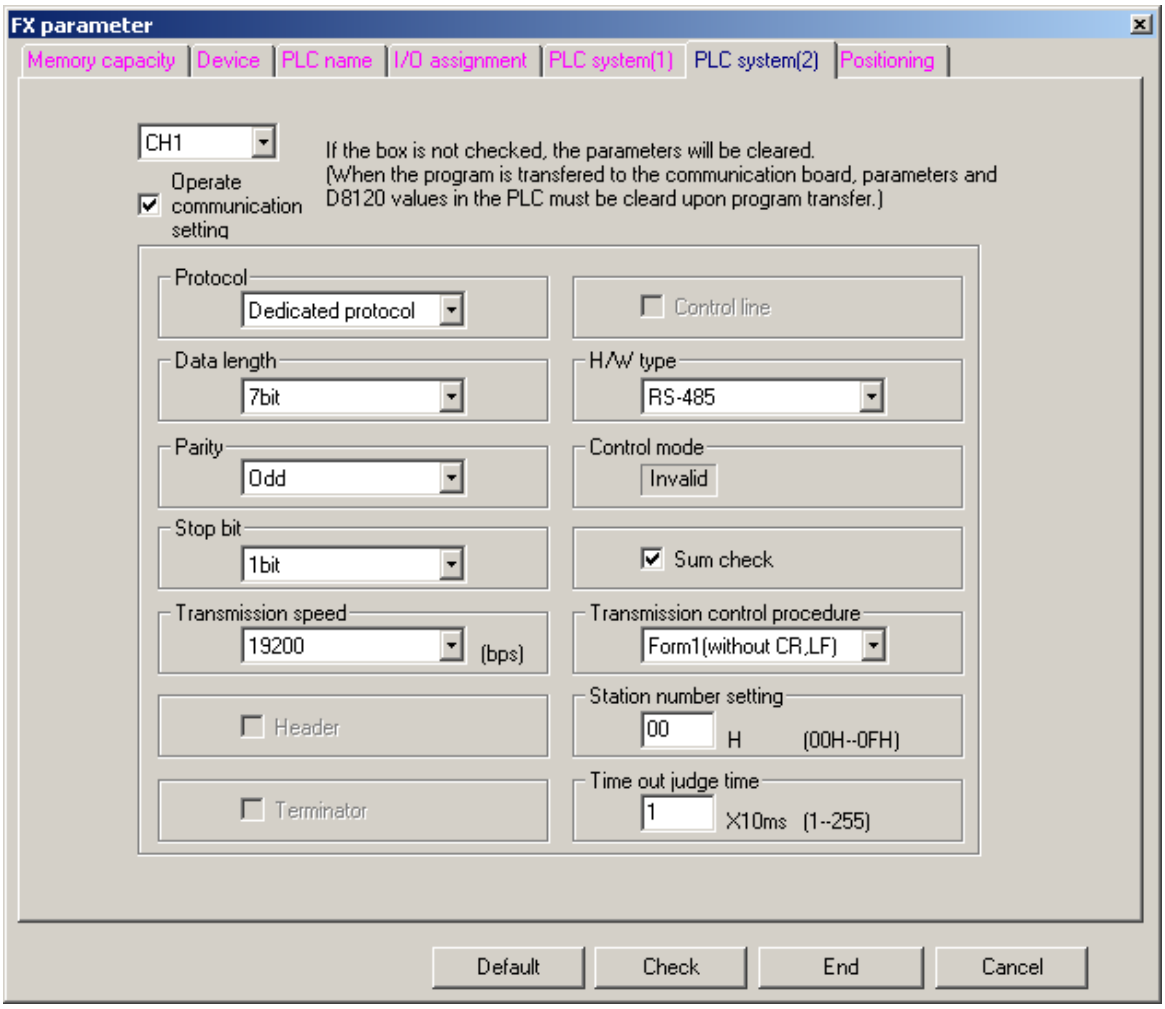
1. use PLC parameters
2. write values to special data registers (D8120, D8121, D8129) in a sequence program. This is the only apporach for FX0N CPUs.

## Set PLC parameters

Start GX Developer or GX IEC Developer and select [Parameter]-[PLC parameter] in the project list. Then select the "PLC system (2)" tab.




| Item | Setting value |
|---|---|
| Operate communication setting | Check the corresponding check box. |
| Protocol | Dedicated protocol |
| Data length | As set by user. |
| Parity | As set by user. |
| Stop bit | As set by user. |
| Transmission speed | As set by user. |
| H/W type | RS-485 |

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| Item | Setting value |
|---|---|
| Sum check | As set by user. |
| Transmission control procedure | Form1 |
| Station number setting | 00H to 0FH |
| Time out judge time | 1 to 255 |

**Note:**
· When communication setting is made, power the FX CPU again after writing to the PLC.
· When performing multi-drop connection, make the same communication settings for the devices. However, make sure that the station numbers do not overlap.

## Special data registers

1) D8120 (Communication format)

<table>
<tr><th>Bit</th><th>Description</th><th>Setting details</th></tr>
<tr><td>b0</td><td>Data length</td><td>0: 7 bit<br>1: 8 bit</td></tr>
<tr><td>b1<br>b2</td><td>Parity</td><td>
<table>
<tr><td></td><td>b2</td><td>b1</td></tr>
<tr><td>None</td><td>0</td><td>0</td></tr>
<tr><td>Odd number</td><td>0</td><td>1</td></tr>
<tr><td>Even number</td><td>1</td><td>1</td></tr>
</table>
</td></tr>
<tr><td>b3</td><td>Stop bit</td><td>0: 1 bit<br>1: 2 bit</td></tr>
<tr><td>b4<br>b5<br>b6<br>b7</td><td>Transmission speed</td><td>
<table>
<tr><td></td><td>b7</td><td>b6</td><td>b5</td><td>b4</td></tr>
<tr><td>300bps</td><td>0</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>600bps</td><td>0</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td>1200bps</td><td>0</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>2400bps</td><td>0</td><td>1</td><td>1</td><td>0</td></tr>
<tr><td>4800bps</td><td>0</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>9600bps</td><td>1</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>19200bps</td><td>1</td><td>0</td><td>0</td><td>1</td></tr>
</table>
</td></tr>
<tr><td>b8</td><td rowspan="2">---</td><td>0</td></tr>
<tr><td>b9</td><td>0</td></tr>
<tr><td>b10<br>b11</td><td>H/W type</td><td>
<table>
<tr><td></td><td>b11</td><td>b10</td></tr>
<tr><td>RS-485</td><td>0</td><td>0</td></tr>
</table>
</td></tr>
</table>

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| Bit | Description | Setting details |
|---|---|---|
| b12 | --- | 0 |
| b13 | Sum check | 0: N/A<br>1: Available |
| b14 | Communication protocol | 1: Computer link |
| b15 | Transmission control procedure | 0: Form 1 |

2) D8121 (Station No. setting)
Specify the station No. in the range of 00H to 0FH

3) D8129 (Time out judge time setting)
Specify the FX CPU timeout as a multiple of 10ms. The range depends on the CPU type:

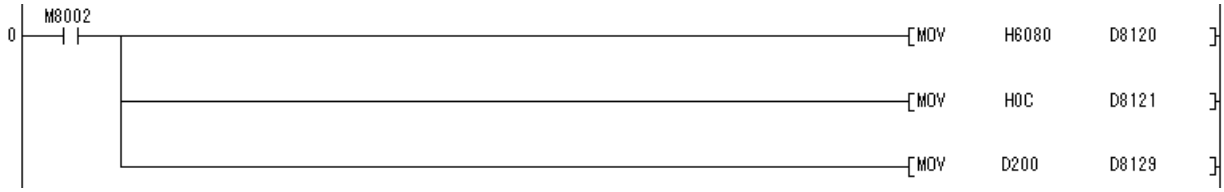
| CPU Type | Range |
|---|---|
| FX0N, FX1S and FX1N(C) | 1 to 255 (10 to 2550ms) |
| FX2N(C) | 1 to 3276 (10 to 32760ms) |

A value of 0 corresponds to 100ms.

**Note:**
· when communication settings have been downloaded, reset the FX CPU
· when setting up a multi-drop connection, apply the same communication settings for all devices. However make sure that the station numbers do not overlap.

REMARK

The following shows an example of setting values to the special data registers by using GX Developer.




The following shows the setting details of each special data register in the above program.

(1) D8120
Transmission control procedure : Form 1
Communication protocol : Computer link
Sum check : Available
H/W type : RS-485
Transmission speed : 9600bps Stop bit : 1 bit Parity : N/A
Data length : 7 bit

(2) D8121
Station No. : 12

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(3) D8129
Time out time : 200ms

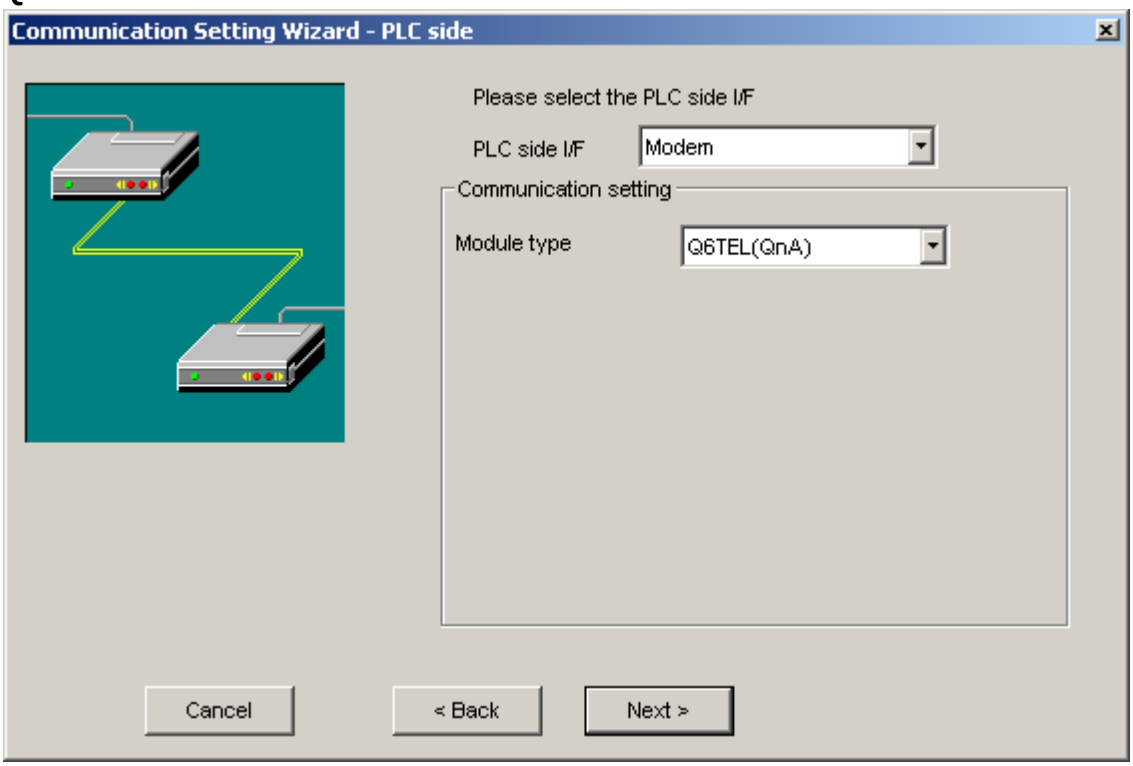
#### 9.3.2.20 PLC Modem

Enter the settings for a modem interface module in the PLC.

## PLC side modem parameters

| Parameter | Values | Description |
|---|---|---|
| Module type | Q6TEL(QnA), FXCPU, AJ71QC24N, QJ71C24, QJ71CMO, LJ71C24 | type of PLC modem or serial interface module |
| Station No. | 0 - 31 | station number of the PLC side interface<br>**only for AJ71QC24N, QJ71C24, QJ71CMO** |
| Transmission speed | 300 - 115200 | baudrate on the serial link<br>**only for AJ71QC24N, QJ71C24, QJ71CMO** |

### Q6TEL




For a description of the editable parameters on the page see PLC side modem parameters.
Pressing the <Next> button opens a page for specifying an optional additional network layer.

### Q6TEL CPU

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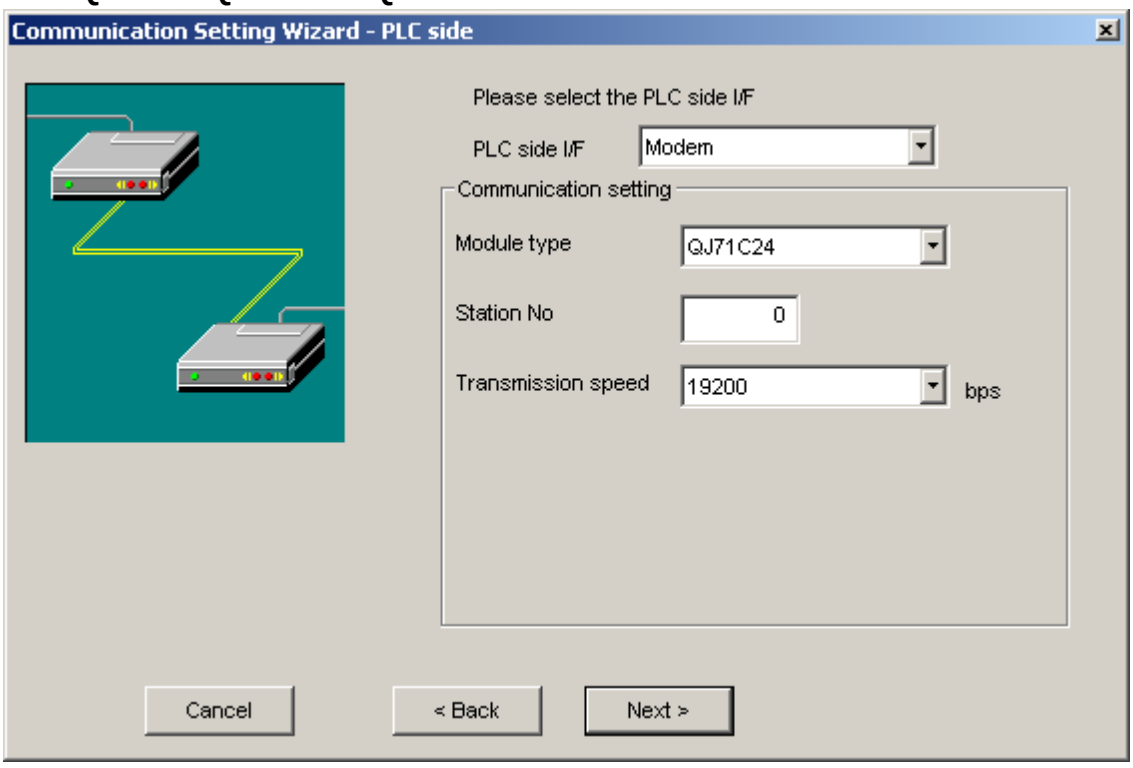
| Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|
| QnACPU | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| o | MELSECNET/H | x | x | x | x | x |
| | MELSECNET/10 | x | x | o | x | x |
| | MELSECNET(II) | x | x | o | x | x |
| | Ethernet | x | x | o | x | x |
| | Computer link | x | x | o | x | x |
| | CC-Link | x | x | x | x | x |
| | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU

## AJ71QC24N / QJ71C24 / QJ71CMO




For a description of the editable parameters on the page see PLC side modem parameters.
Pressing the <Next> button opens a page for specifying an optional additional network layer.

## QJ71C24 CPU

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| Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|
| QCPU (Q mode) | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| o | MELSECNET/H | o | x | x | x | x |
| | MELSECNET/10 | o | o | o | o | x |
| | MELSECNET(II) | x | x | x | x | x |
| | Ethernet | o | x | o | x | x |
| | Computer link | *2 | x | o | x | x |
| | CC-Link | o | o | o | o | x |
| | CC-Link IE | *3 | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU
*2 :For the Redundant PLC, access is disabled
*3 : partially supported, depends on CPU type

### AJ71QC24 CPU

| Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|
| QCPU (Q mode) | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| o | MELSECNET/H | x | x | x | x | x |
| | MELSECNET/10 | x | x | o | x | x |
| | MELSECNET(II) | x | x | o | x | x |
| | Ethernet | x | x | o | x | x |
| | Computer link | x | x | o | x | x |
| | CC-Link | x | x | o | x | x |
| | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU

### FX CPU

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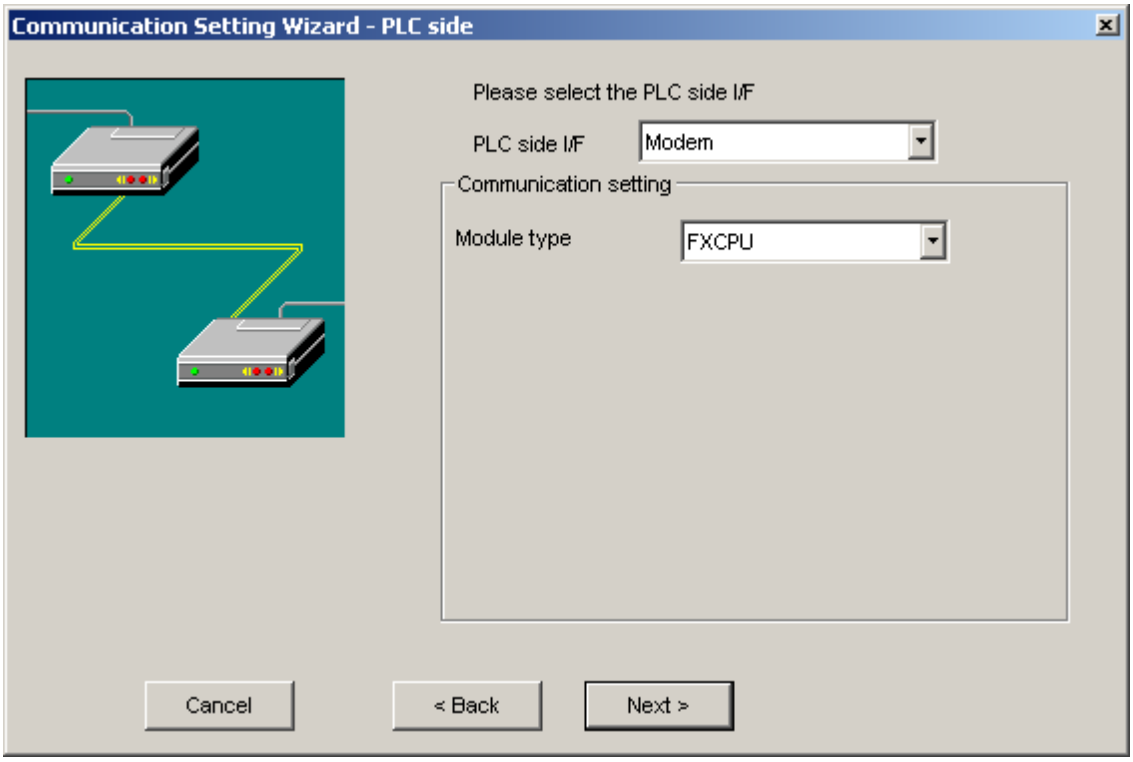


For a description of the editable parameters on the page see PLC side modem parameters.
Pressing the <Next> button opens a page for specifying an optional additional network layer.

| Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|
| FXCPU | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| o | MELSECNET/H | x | x | x | x | x |
| | MELSECNET/10 | x | x | x | x | x |
| | MELSECNET(II) | x | x | x | x | x |
| | Ethernet | x | x | x | x | x |
| | Computer link | x | x | x | x | x |
| | CC-Link | x | x | x | x | x |
| | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU

## LJ71C24

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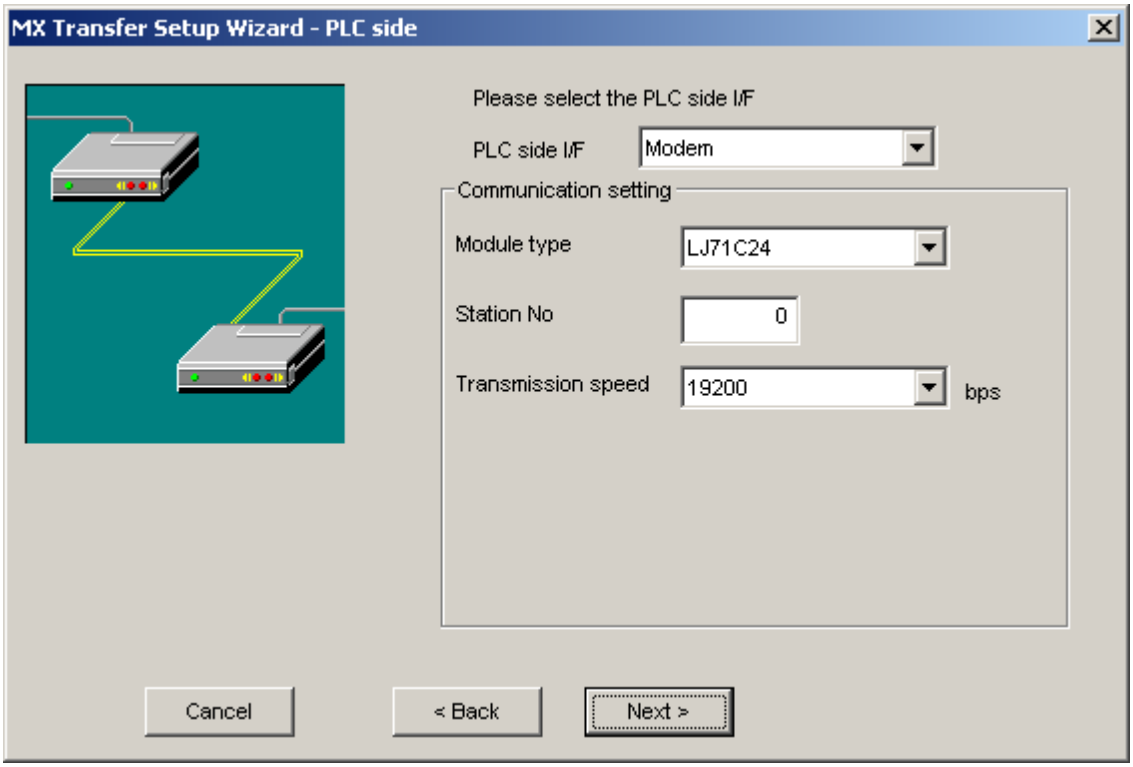


### 9.3.2.21 PLC Ethernet Interface

Enter the settings for an Ethernet module in the PLC.

## PLC side Ethernet module parameters

| Parameter | Values | Description |
|---|---|---|
| Connect module | AJ71E71, AJ71QE71, QJ71E71, FX-ENET(-ADP), CPU module, CC IE Field Ethernet Adapter | type of PLC ethernet module |
| Host (IP address) | nnn.nnn.nnn.nnn | IP address of the PLC side interface. This value must equal the address, which has been configured in the 'Network Parameters' of the PLC settings. |
| Network No | 1 - 239 | network number of the E71 ethernet module. This value can only be edited in the 'PC Ethernet board' page.<br>**only for QJ71E71 modules** |
| Station No. | 1 - 64 | station number of the PLC side interface. This value must equal the station number, which has been configured in the 'Network Parameters' of the PLC settings.<br>**only for QJ71E71 modules** |

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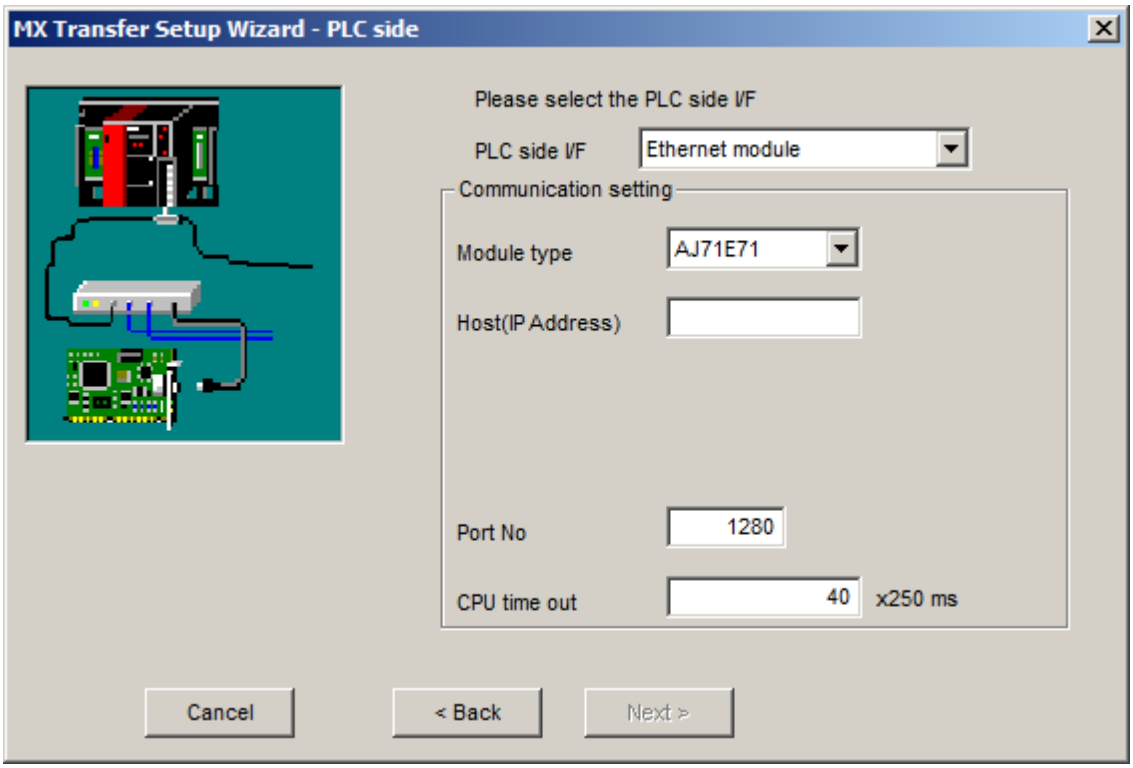
| Parameter | Values | Description |
|---|---|---|
| Port No. | 0 - 65535 | free UDP port number on the PC side for data sent by the PLC. Port numbers below 1025 should not be used.<br>**only for AJ71E71 (UDP and TCP), AJ71QE71 (TCP), FX-ENET-ADP modules** |
| CPU time out | 1 - 65535 | CPU timeout as multiple of 250 milliseconds<br>**only for AJ71E71 modules** |

**Note:**
The 'Next >' button is disabled, if no IP address has been entered.

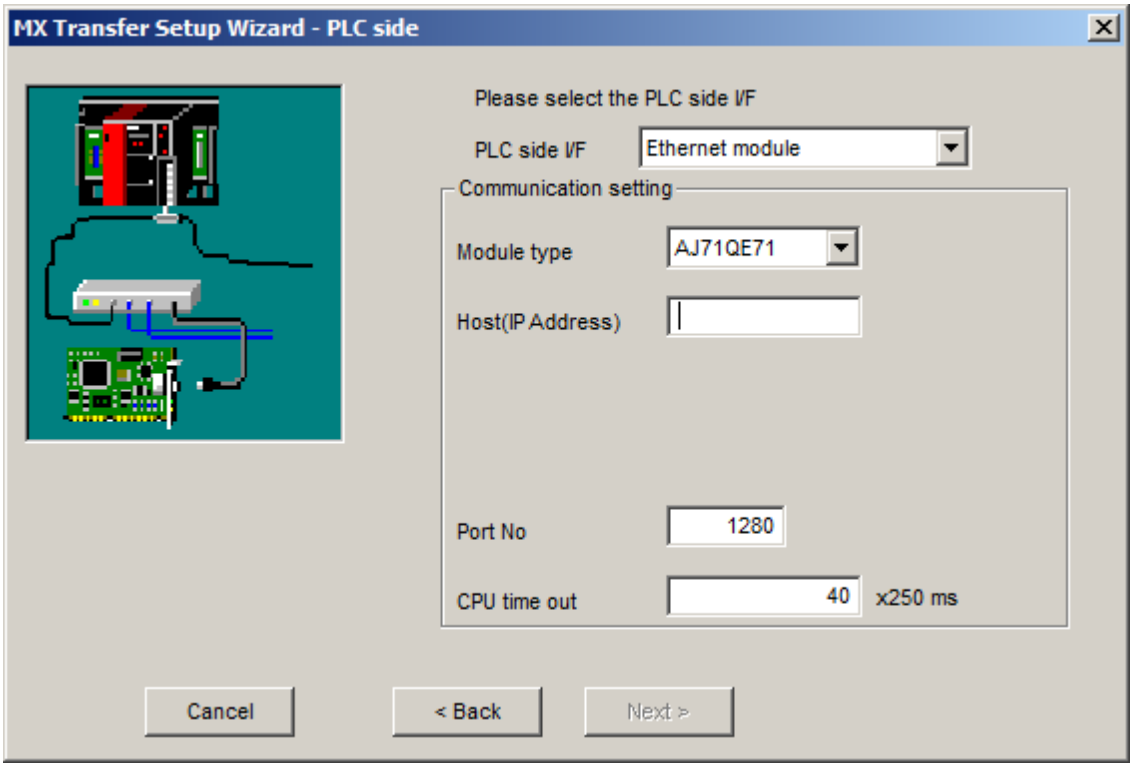
**Note:**
Replacement of Ethernet modules
If the PLC Ethernet module has been replaced during Ethernet communication, the communication on the PC must be restarted, because Ethernet (MAC) address is different.

## AJ71E71



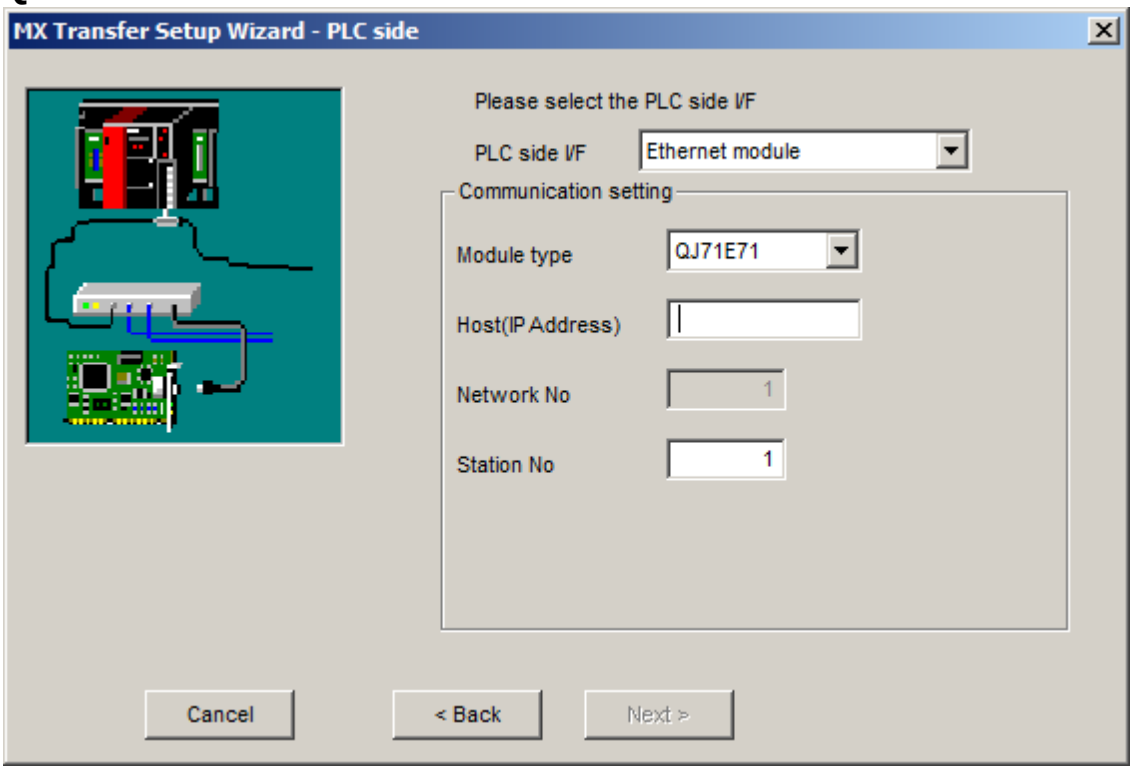

For a description of the editable parameters on the page see PLC side Ethernet module parameters.
Pressing the <Next> button opens a page for specifying an optional additional network layer.

## AJ71QE71




For a description of the editable parameters on the page see PLC side Ethernet module parameters.
Pressing the <Next> button opens a page for specifying an optional additional network layer.

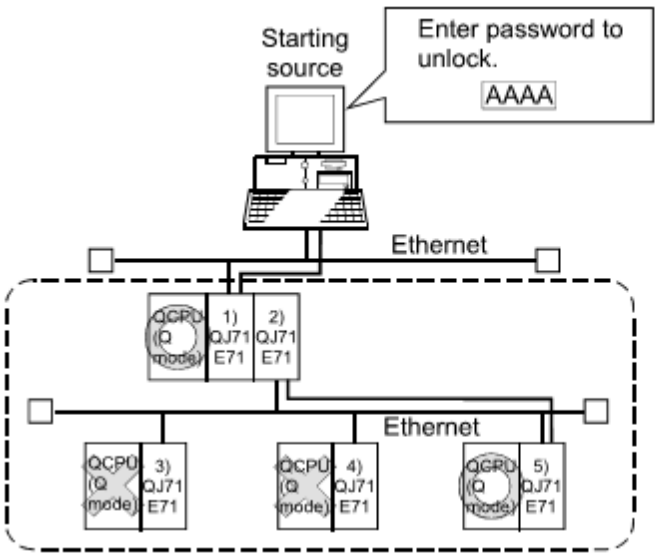
## QJ71E71




For a description of the editable parameters on the page see PLC side Ethernet module parameters.
Pressing the <Next> button opens a page for specifying an optional additional network layer.

### Unlocking password when using QJ71E71

If a password has been set in a QJ71E71 for remote access, the corresponding PLC cannot be accessed as target PLC. A password has however no effect, when the E71 module is used as a relay.




| No. | Remote Password |
|---|---|
| 1) | With setting (AAAA) |
| 2) | Without setting |
| 3) | With setting (AAAA) |
| 4) | With setting (BBBB) |
| 5) | Without setting |

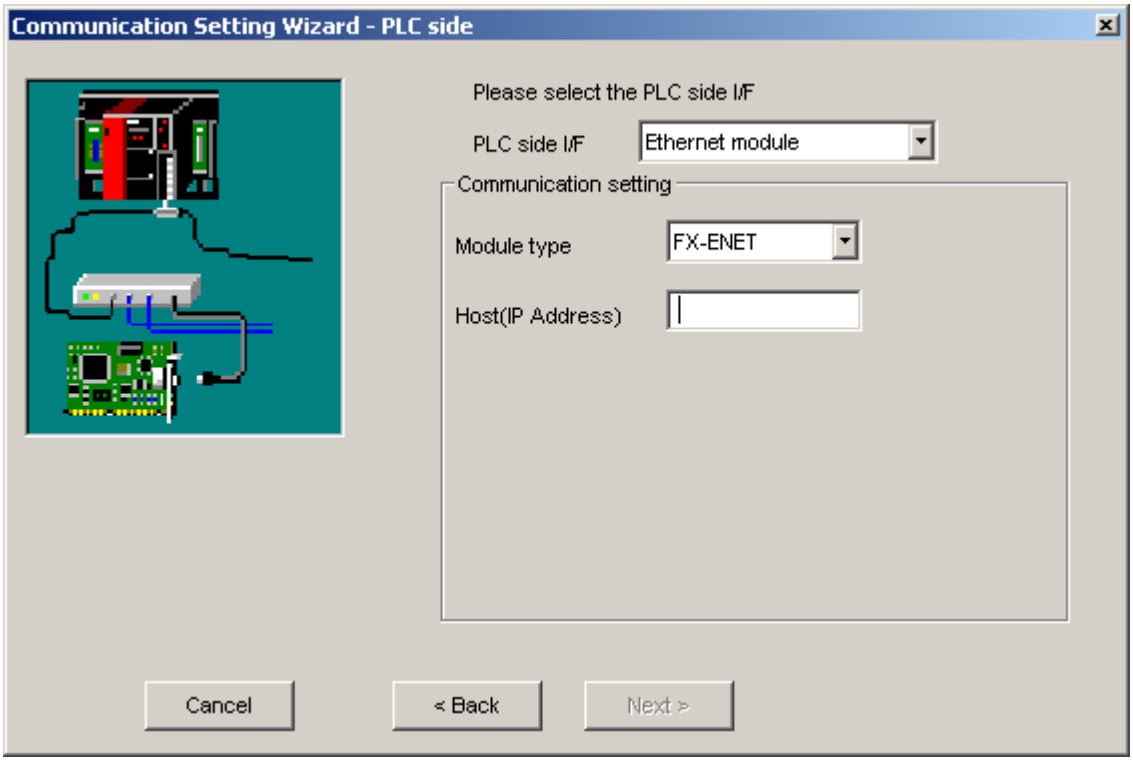
○ : Accessible
× : Inaccessible

1) Unlocking QJ71E71 passw ord enables access to PLC CPUs in this range.

### Use of Q4AR CPU

For using UDP/IP protocol the manufacture date (year and month) of the Q4AR CPU must be "0012" or later and the function version must be 'B' at least.

## FX Ethernet Module




For a description of the editable parameters on the page see PLC side Ethernet module parameters.
Pressing the <Next> button opens a page for specifying an optional additional network layer.

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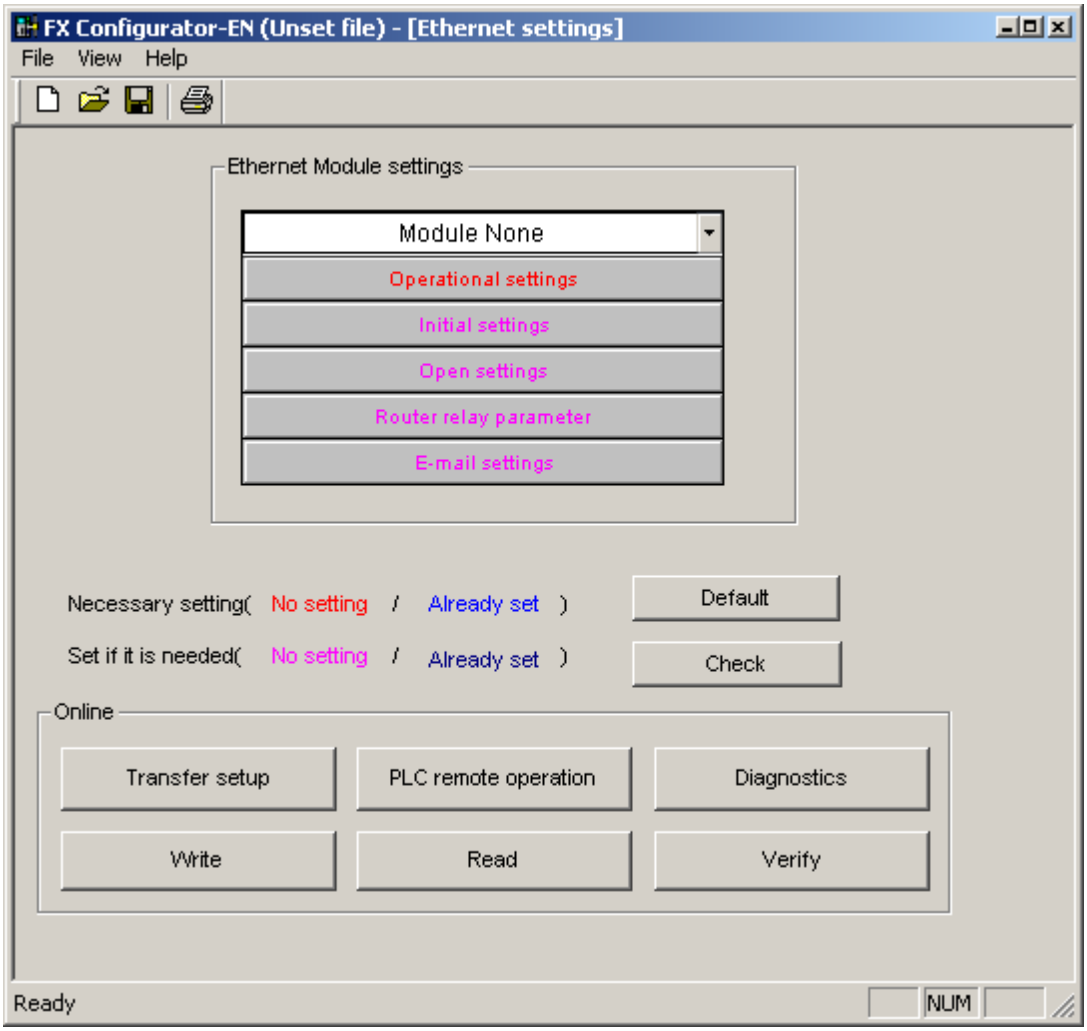
Because GX Developer and GX IEC Developer cannot configure the FX-ENET Ethernet module for FX3U(C) PLCs, there is another tool (FX Configurator-EN) to set up the communication parameters:




(1) Select the module, up to 8 modules can be selected.
(2) Dialog to select the operational setting:

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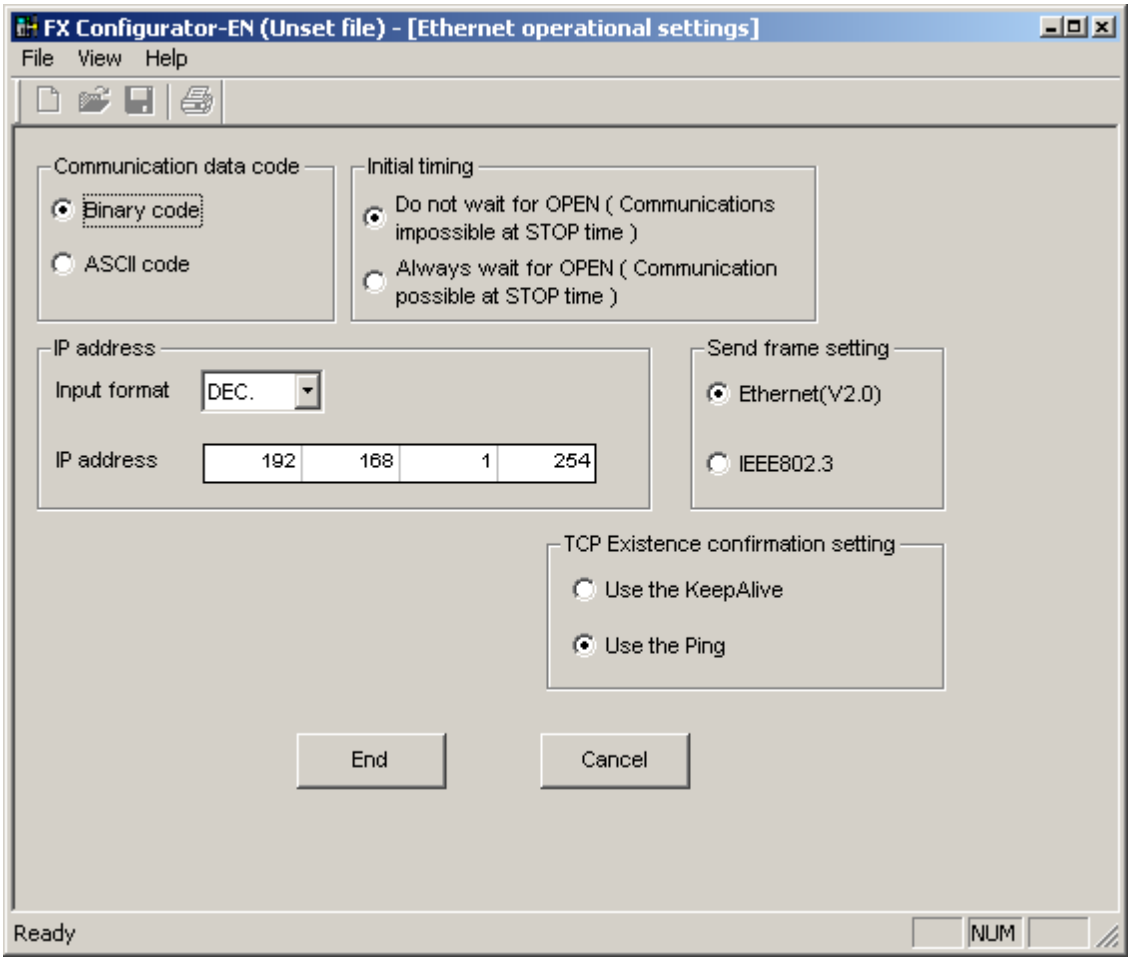
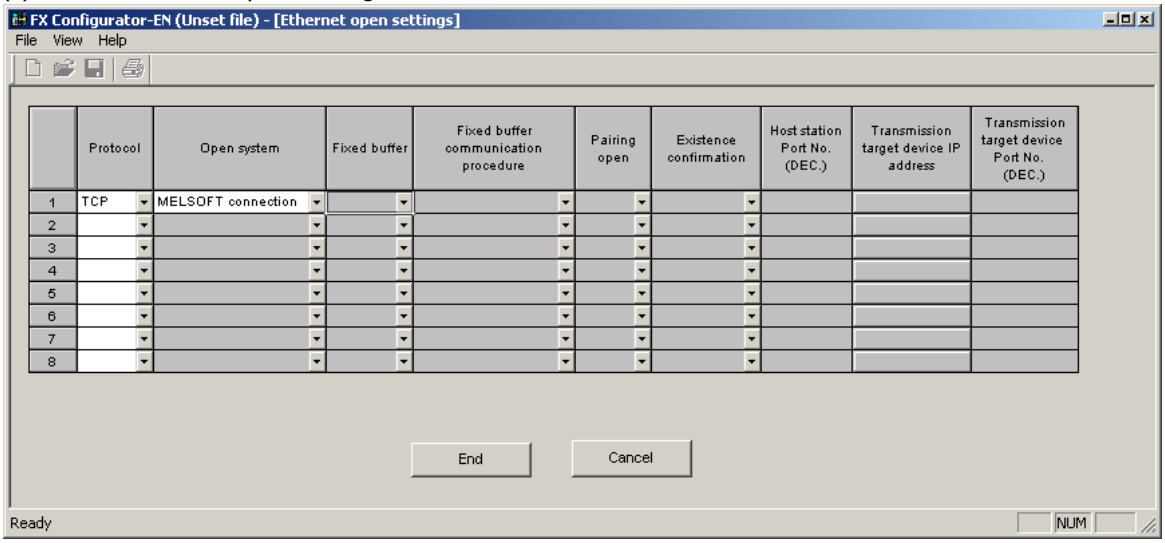



(3) Set the ethernet open setting:




(4) Dialog to select the router:

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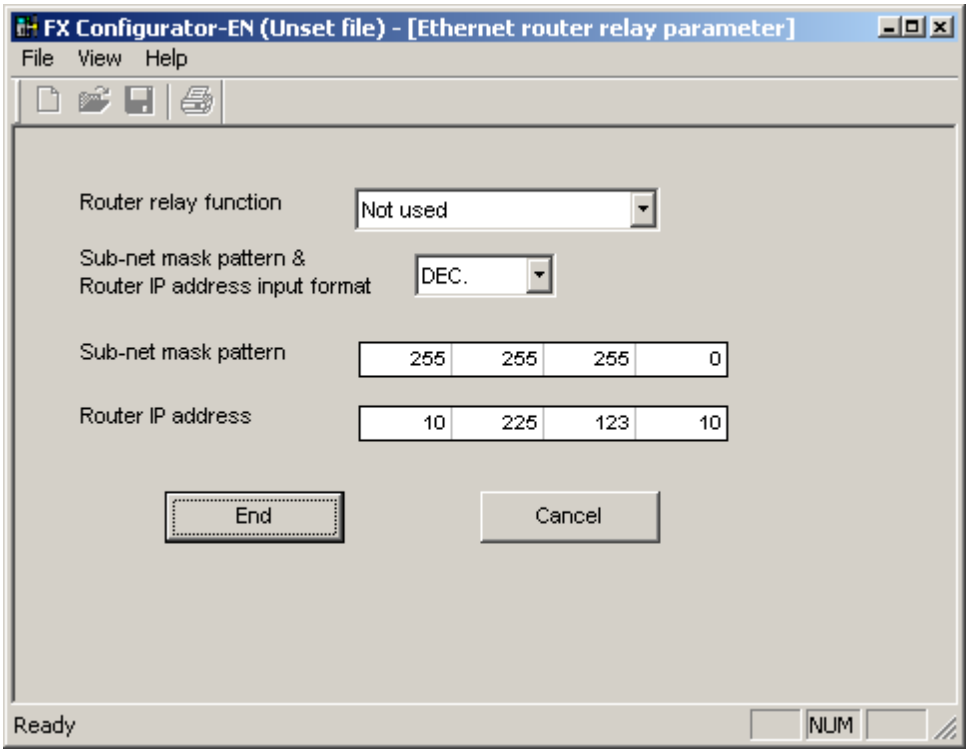


(5) Transfer setup is used to download the Ethernet parameter to the FX-ENET. The transfer happens through the PLC, so that the corresponding setting should be selected, for example serial communication to transfer the Ethernet parameters.

The ethernet communication via FX-ENET-ADP for FX1S, FX1N(C) and FX2N(C) is configured through settings in special PLC devices.
Set the ethernet parameters to nine data registers from D1000 to D1008. If these data registers are used for any other purpose, the ethernet parameters can be set to nine registers 'D' starting from D2000, D3000, D4000, D5000, D6000 or D7000.

| Data registers | Setting Item | Default parameter | Description |
|---|---|---|---|
| Dn000, Dn001 | Header | - | Set H454E4554 ("ENET") |
| Dn002, Dn003 | IP address | 192.168.0.100 | Set the IP address of the FX-ENET module |
| Dn004, Dn005 | subnet mask | 255.255.255.0 | Set the sub net mask of the FX-ENET module |
| Dn006, Dn007 | Gateway address | 192.168.0.1 | Set the gateway address ofthe FX-ENET module |
| Dn008 | TCP port number | 1024 | Set the TCP port number within the range from 1024 to 65535 |

n: Choose any number in the range betw een 1 and 7

## When a PLC program is used to set the ethernet parameters

The ethernet parameters for the FX-ENET-ADP can be set using the PLC program below:

**Note:**
In the FX-ENET-ADP the ethernet parameters become valid only when the power is turned ON and the setting data is stored in specified data registers.
In any of the following cases, turn off the power of the PLC once, and turn it on again.

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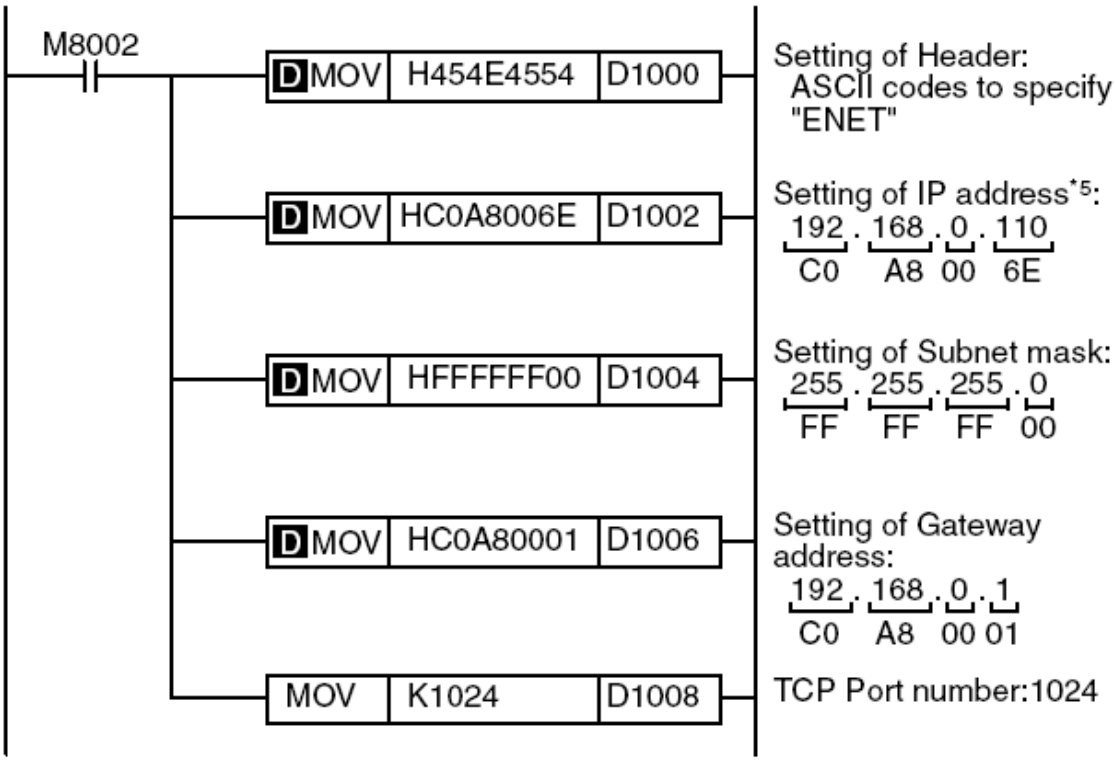
- when a parameter is set for the first time
- when the setting of a parameter is changed during operation




*5: When connecting two or more PLCs to a network, do not use the IP address twice.

| | | |
|---|---|---|
| Example: | Personal Computer (GX IEC Developer) | 192.168.0.10 |
| | PLC1 | 192.168.0.110 |
| | PLC2 | 192.168.0.111 |

## PLC Ethernet CPU

If **TCP** has been selected in the previous page, the following page is displayed:

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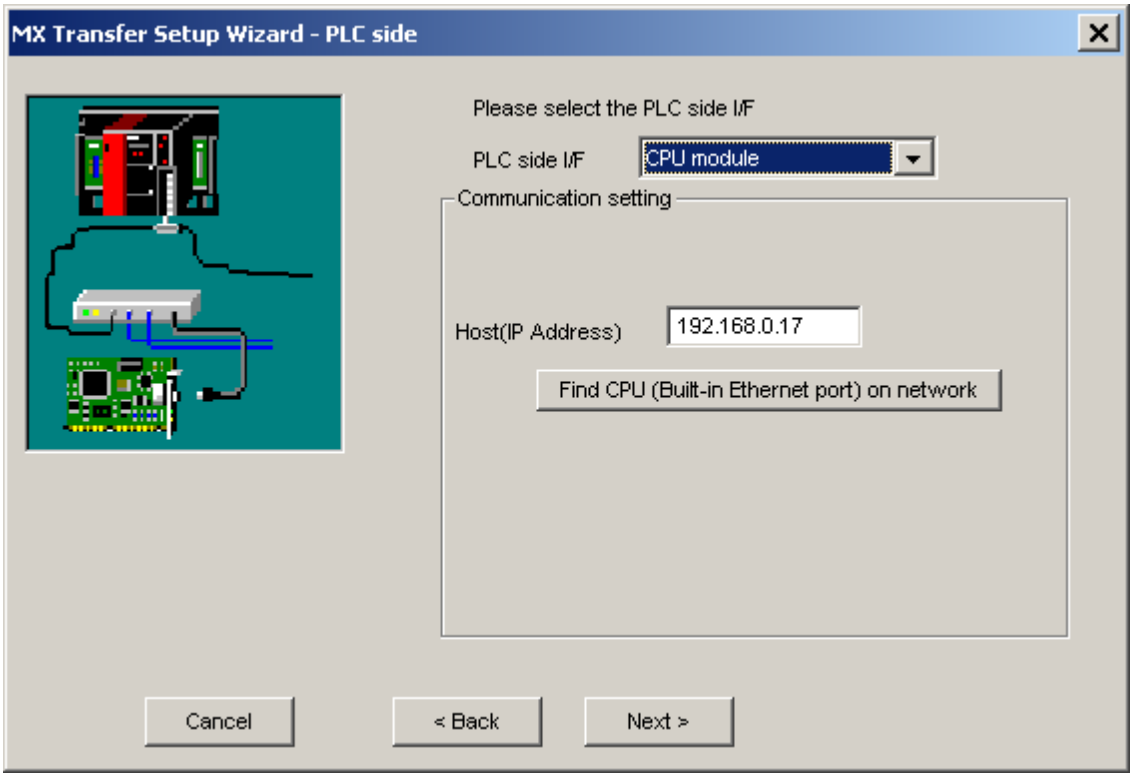
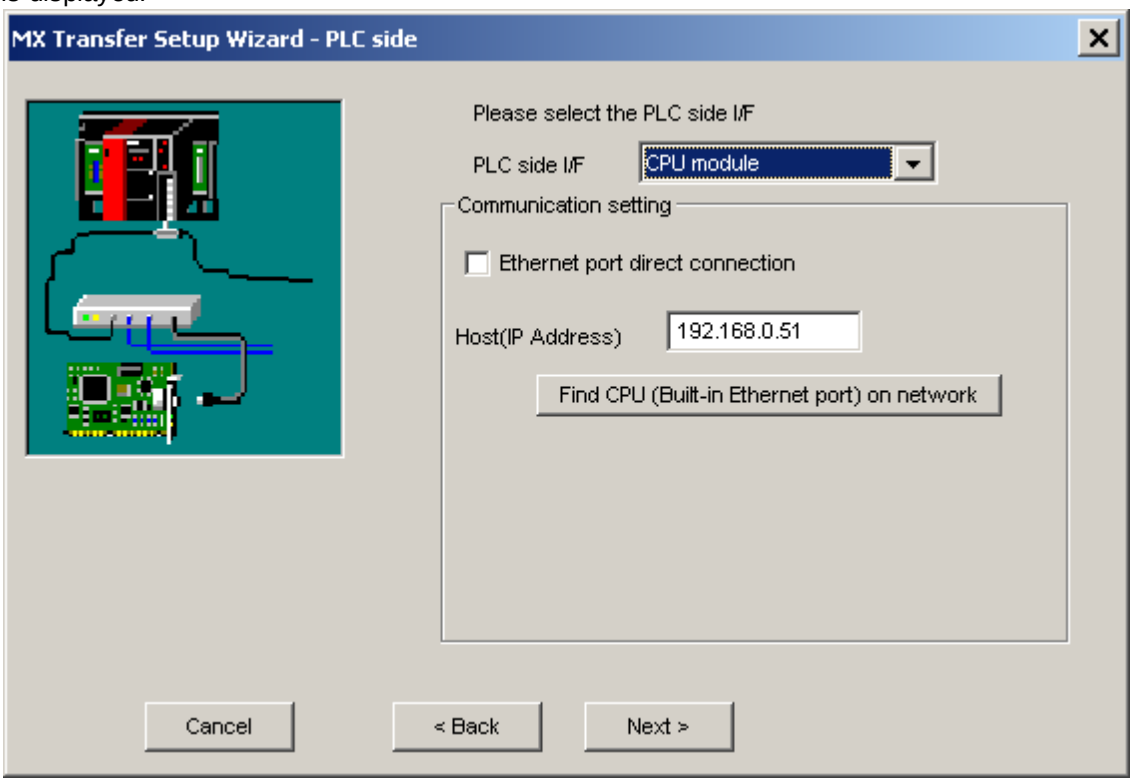



The IP address of the Ethernet interface can be manually entered or looked up online. Pressing the 'Find CPU' button opens the 'Find CPU' dialog, in which the QnUDE and L-series CPUs in the local network are listed.

If **UDP** has been selected in the previous page, the additional option 'Ethernet port direct connection' is displayed.




If the option 'Ethernet port direct connection' has been selected, the Ethernet interfaces of PC and

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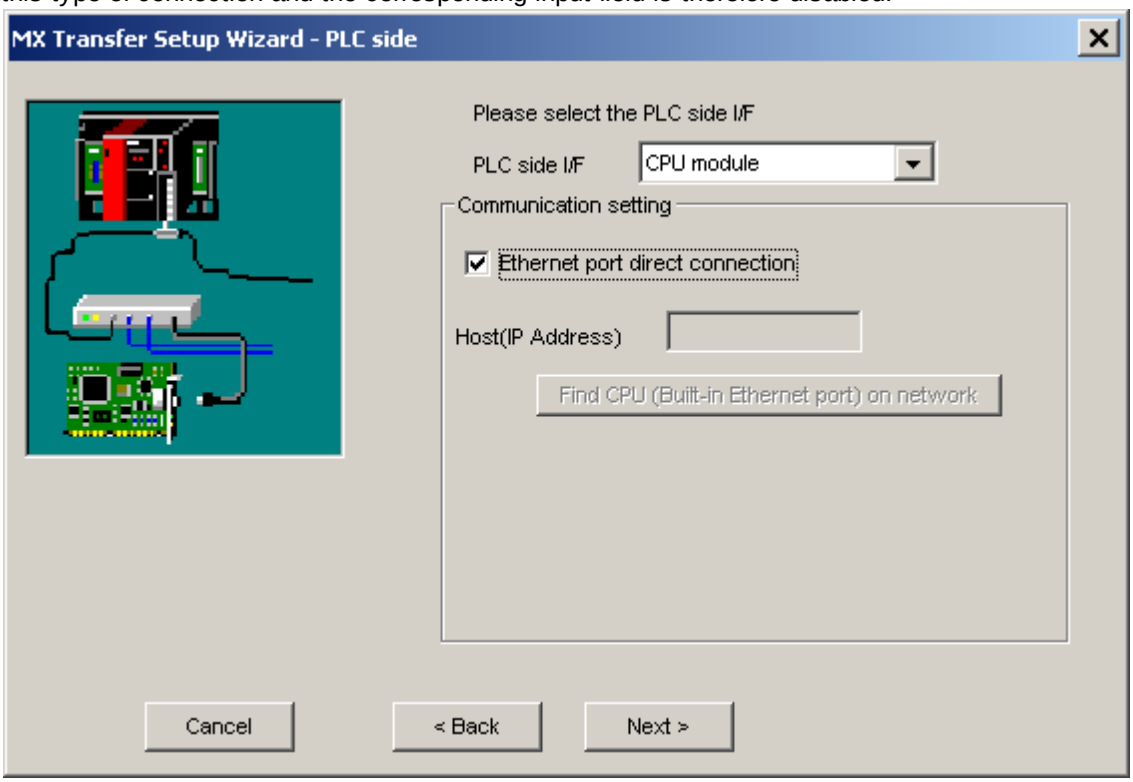
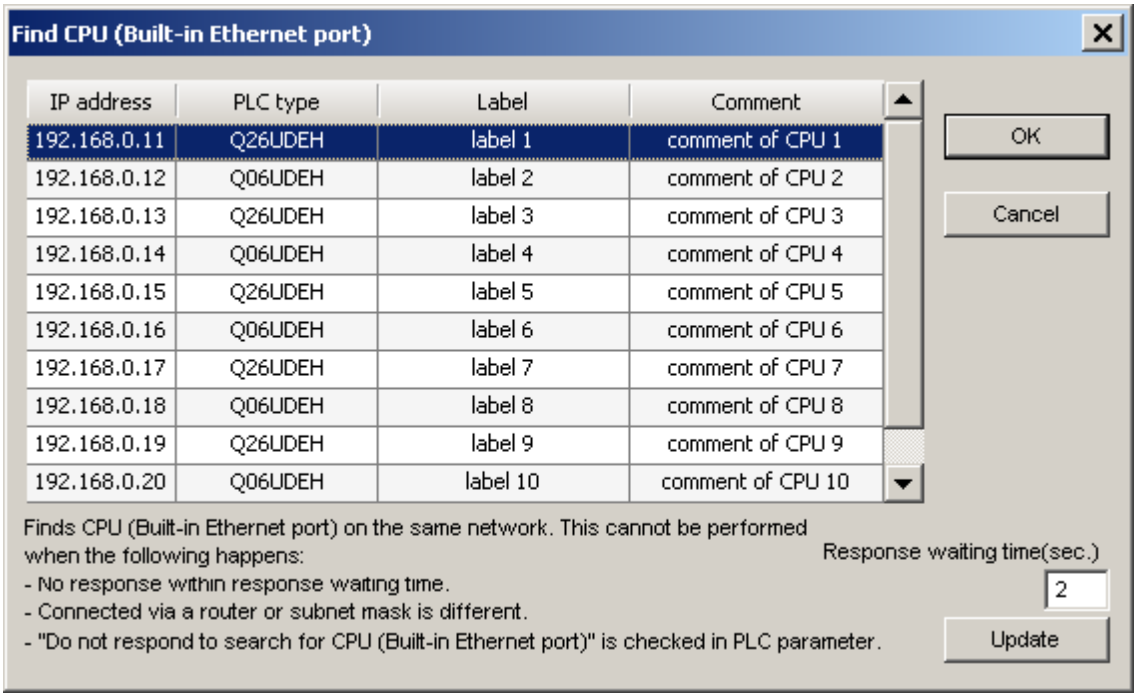
PLC CPU must be connected point-to-point with a single cable. The IP address is not required for this type of connection and the corresponding input field is therefore disabled.




## Find CPU


Find CPU (Built-in Ethernet port)
IP address
PLC type
Label
Comment
192.168.0.11 Q26UDEH label 1 comment of CPU 1
192.168.0.12 Q06UDEH label 2 comment of CPU 2
192.168.0.13 Q26UDEH label 3 comment of CPU 3
192.168.0.14 Q06UDEH label 4 comment of CPU 4
192.168.0.15 Q26UDEH label 5 comment of CPU 5
192.168.0.16 Q06UDEH label 6 comment of CPU 6
192.168.0.17 Q26UDEH label 7 comment of CPU 7
192.168.0.18 Q06UDEH label 8 comment of CPU 8
192.168.0.19 Q26UDEH label 9 comment of CPU 9
192.168.0.20 Q06UDEH label 10 comment of CPU 10
OK
Cancel
Finds CPU (Built-in Ethernet port) on the same network. This cannot be performed when the following happens:
- No response within response waiting time.
- Connected via a router or subnet mask is different.
- "Do not respond to search for CPU (Built-in Ethernet port)" is checked in PLC parameter.
Response waiting time(sec.)
2
Update

This dialog lists the QnUDE and L-series CPUs found in the local Ethernet network. When a CPU in the list is selected and the **OK** button pressed, the IP address of the selected CPU is copied to the 'Host(IP Address)' field. By pressing '**Update**' the local Ethernet network is scanned again for QnUDE and L-series CPUs and the list is updated. The time to wait for CPUs to respond during the search is entered in the field '**Response waiting time**'.

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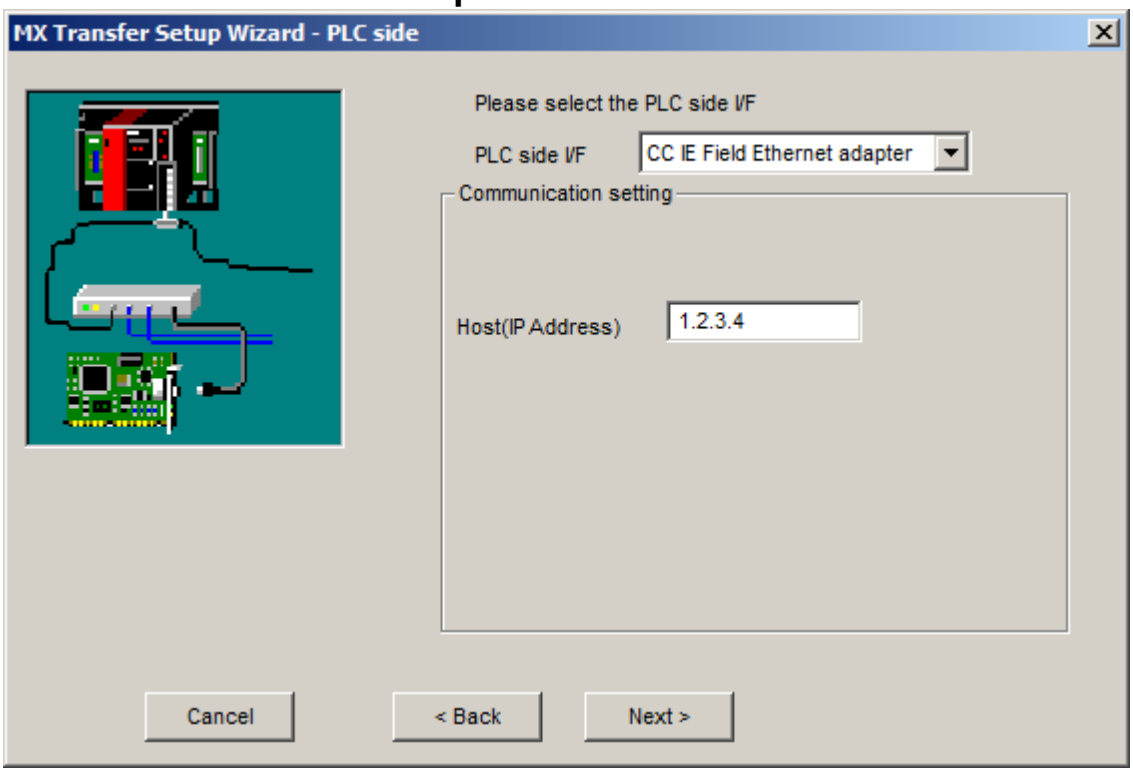
## CC IE Field Ethernet Adapter




### 9.3.2.22 PLC G4 Module

Enter the settings for a G4 module connected to the PC.

## PLC side G4 module parameters

| Parameter | Values | Description |
|---|---|---|
| Mode | A, QnA, Q | type of PLC C24 module |
| Transmission speed | 9600 - 115200 | baudrate on the serial link<br>**available baudrates depend on selected mode** |
| Control | DTR only, RTS only, DTR and RTS, DTR or RTS | handshake signals |

**Note:**
The CC-Link G4 module used in CC-Link G4 communication (only when the AJ65BT-G4 is used) must have software version 'D' or later. Modules with software version 'C' or earlier will not operate properly.

## G4 Module connected to PC

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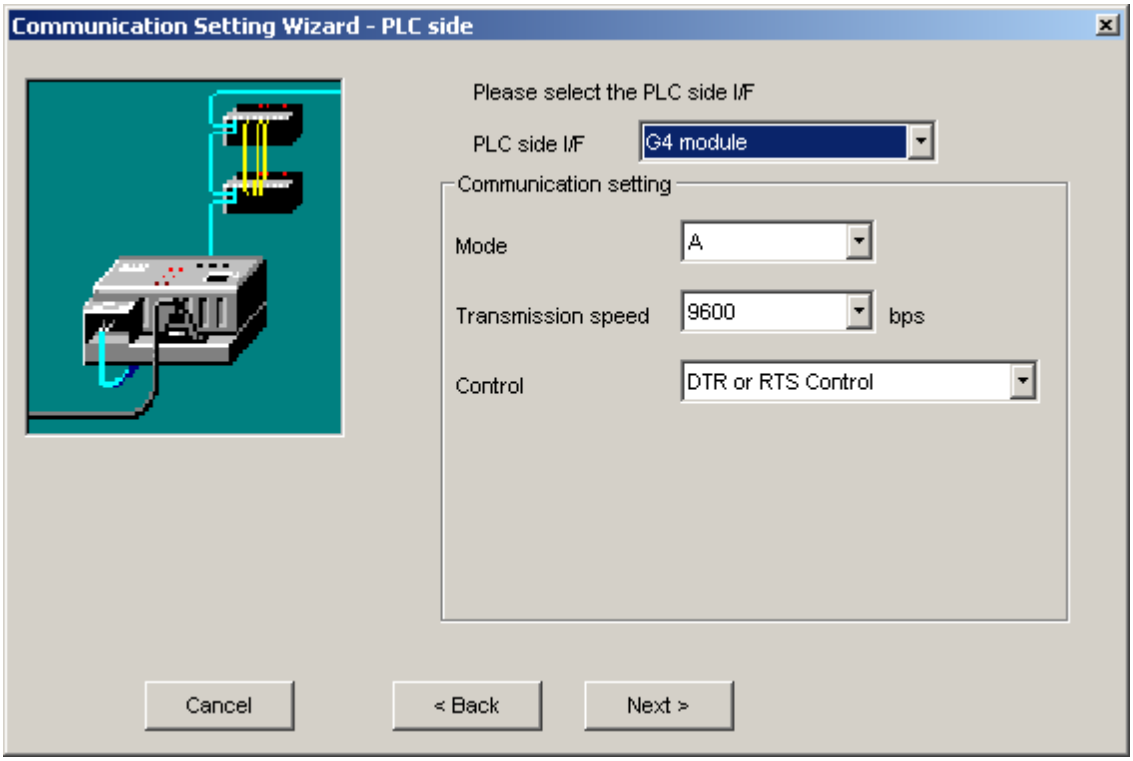


For a description of the editable parameters on the page see PLC side G4 module parameters.
Pressing the <**Next**> button opens a page for specifying an optional additional network layer.

## Q mode

| Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|
| QCPU (Q mode) | | QCPU (Q mode) | QCPU (A mode) | QnA CPU | ACPU *1 | FXCPU |
| | MELSECNET/H | o | x | x | x | o |
| | MELSECNET/10 | o | o | o | o | o |
| | MELSECNET(II) | x | x | x | x | o |
| | Ethernet | o | o | o | x | x |
| | Computer link | o | x | o | x | x |
| | CC-Link | x | x | x | x | x |
| | CC-Link IE | *2 | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU
*2 : partially supported, depends on CPU type

## QnA mode

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| Connected Station CPU | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|
| QnACPU | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| | MELSECNET/H | x | x | x | x | x |
| | MELSECNET/10 | x | x | o | x | x |
| | MELSECNET(II) | x | x | o | x | x |
| | Ethernet | x | x | o | x | x |
| | Computer link | x | x | o | x | x |
| | CC-Link | x | x | x | x | x |
| | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU

**A mode**

| Connected Station CPU | | | Relayed Network | Relayed Station CPU | | | | |
|---|---|---|---|---|---|---|---|---|
| QCPU (A mode) | QnACPU | ACPU *1 | | QCPU (Q mode) | QCPU (A mode) | QnACPU | ACPU *1 | FXCPU |
| o | x | o | MELSECNET/H | x | x | x | x | x |
| | | | MELSECNET/10 | x | x | x | x | x |
| | | | MELSECNET(II) | x | x | x | x | x |
| | | | Ethernet | x | x | x | x | x |
| | | | Computer link | x | x | x | x | x |
| | | | CC-Link | x | x | x | x | x |
| | | | CC-Link IE | x | x | x | x | x |

o: Accessible
x: Inaccessible
*1 : Including motion controller CPU

## Host station attached to G4 module

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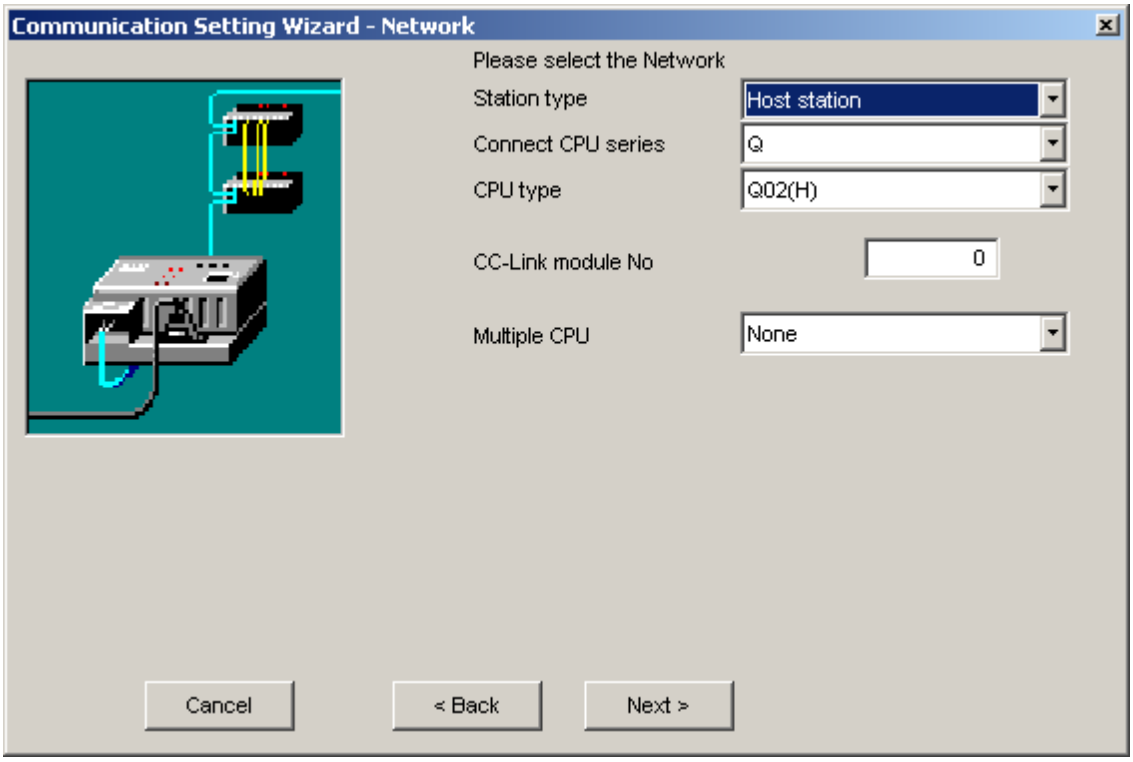
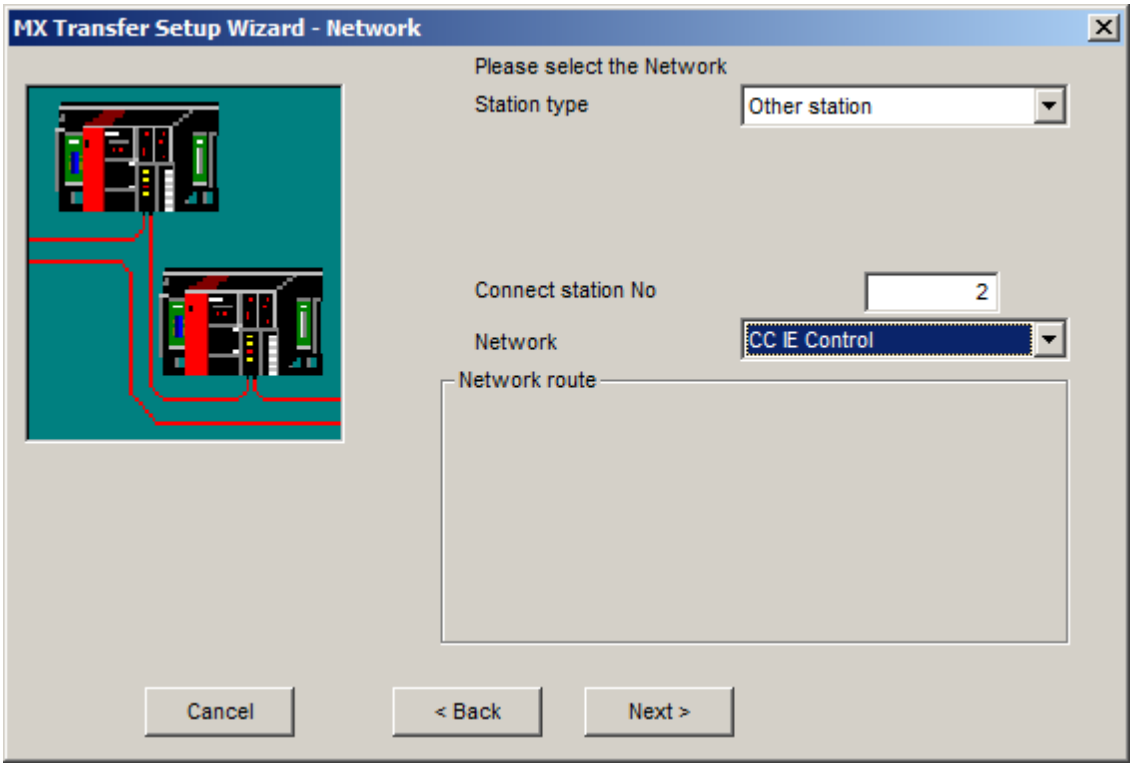



Pressing the <**Next**> button opens a page for entering a comment for the connection.

## Other station in a network attached to G4 module

## In a CC IE Control network




## In a CC IE Field network

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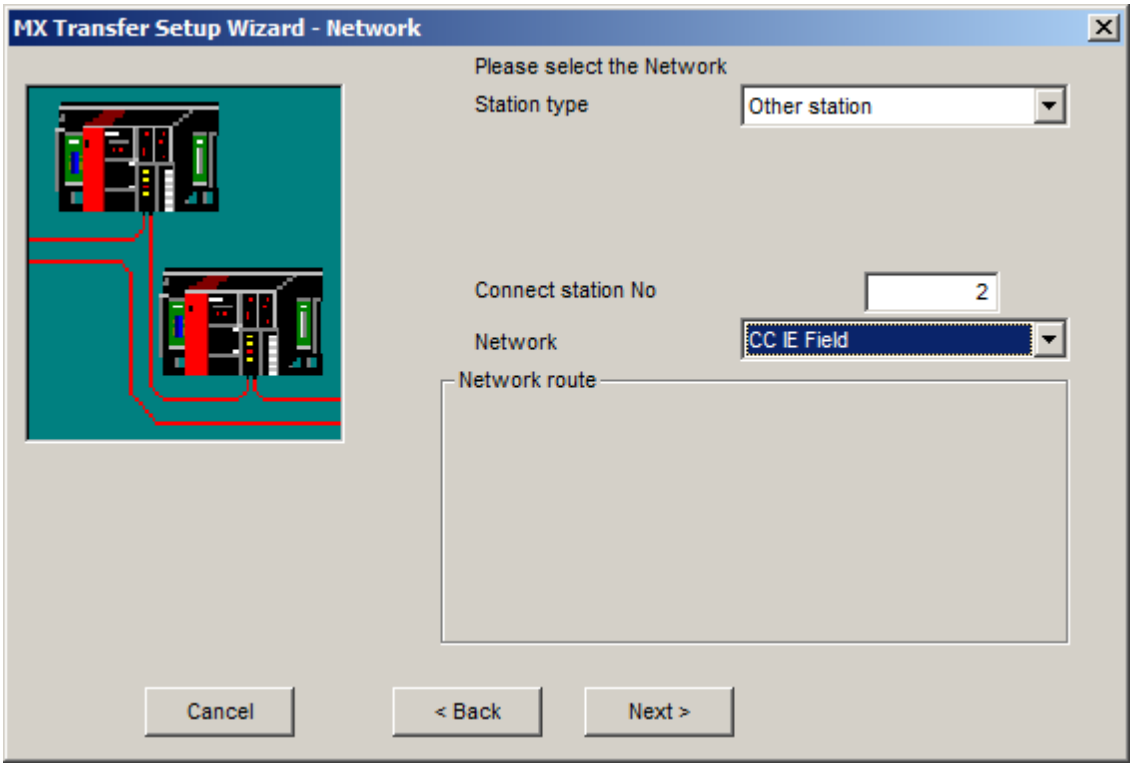
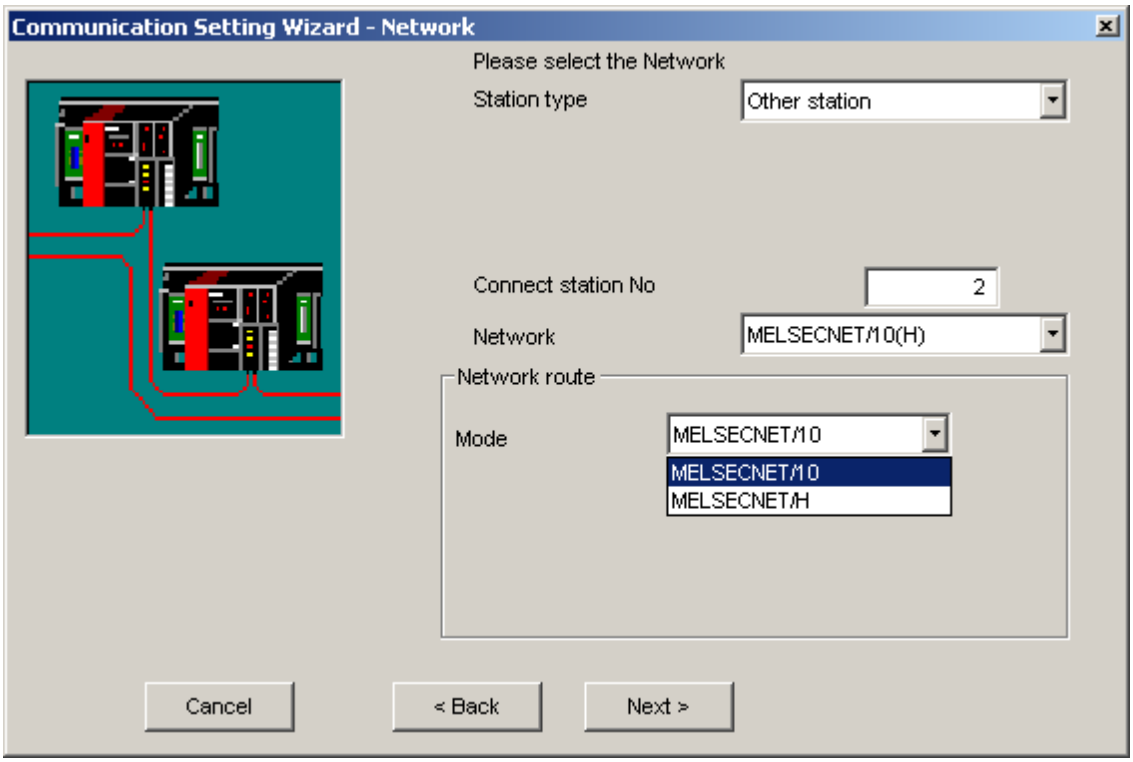



### In a MELSECNET/10 network




Pressing the <**Next**> button opens a page for specifying the station type and address.

### In an Ethernet network

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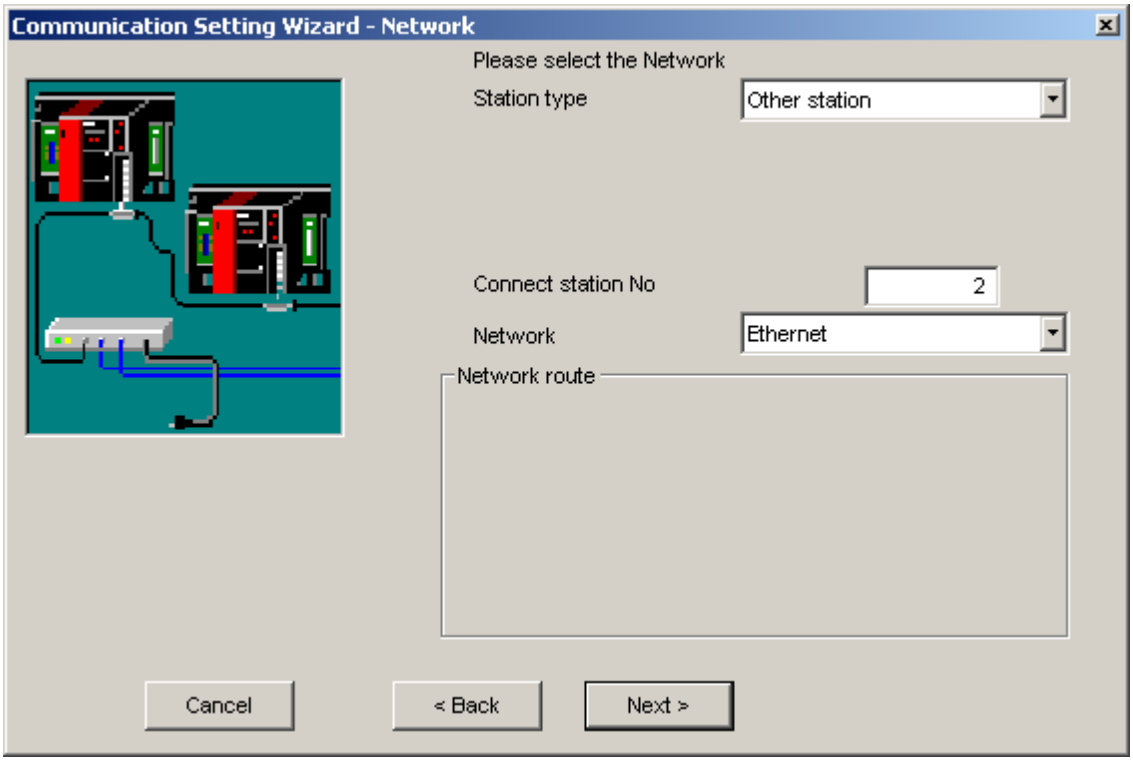
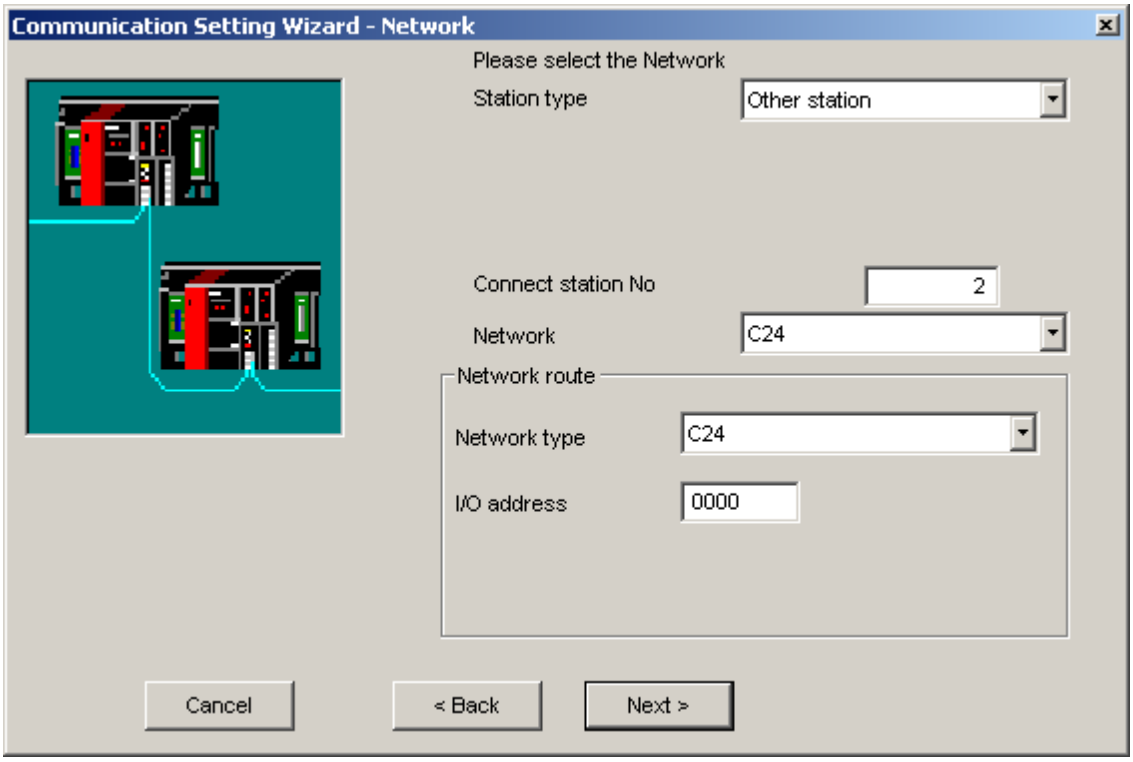



Pressing the <**Next**> button opens a page for specifying the station type and address.

### In a C24 network




Pressing the <**Next**> button opens a page for specifying the station type and address.

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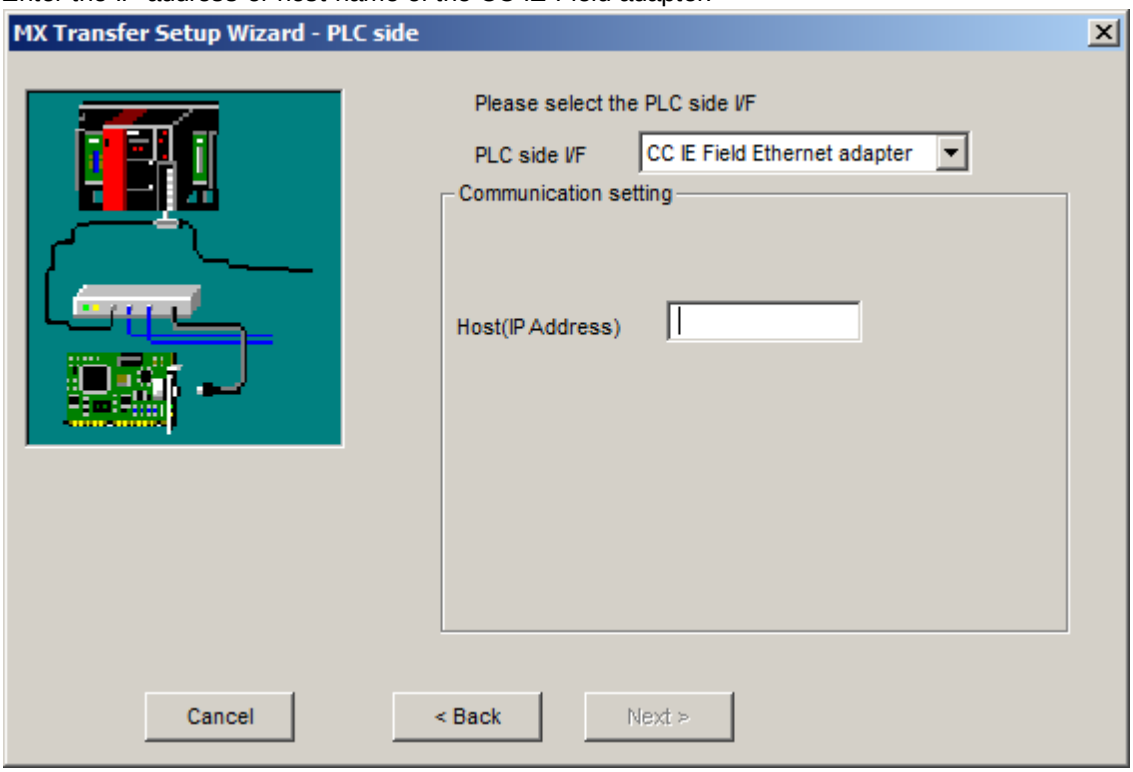
### 9.3.2.23 PLC CC-Link IE Field Ethernet Adapter

Enter the IP address or host name of the CC IE Field adapter.




| Parameter | Values | Description |
|---|---|---|
| Host (IP Address) | IP address or host name | IP address of the CC-Link IE Field Ethernet interface |

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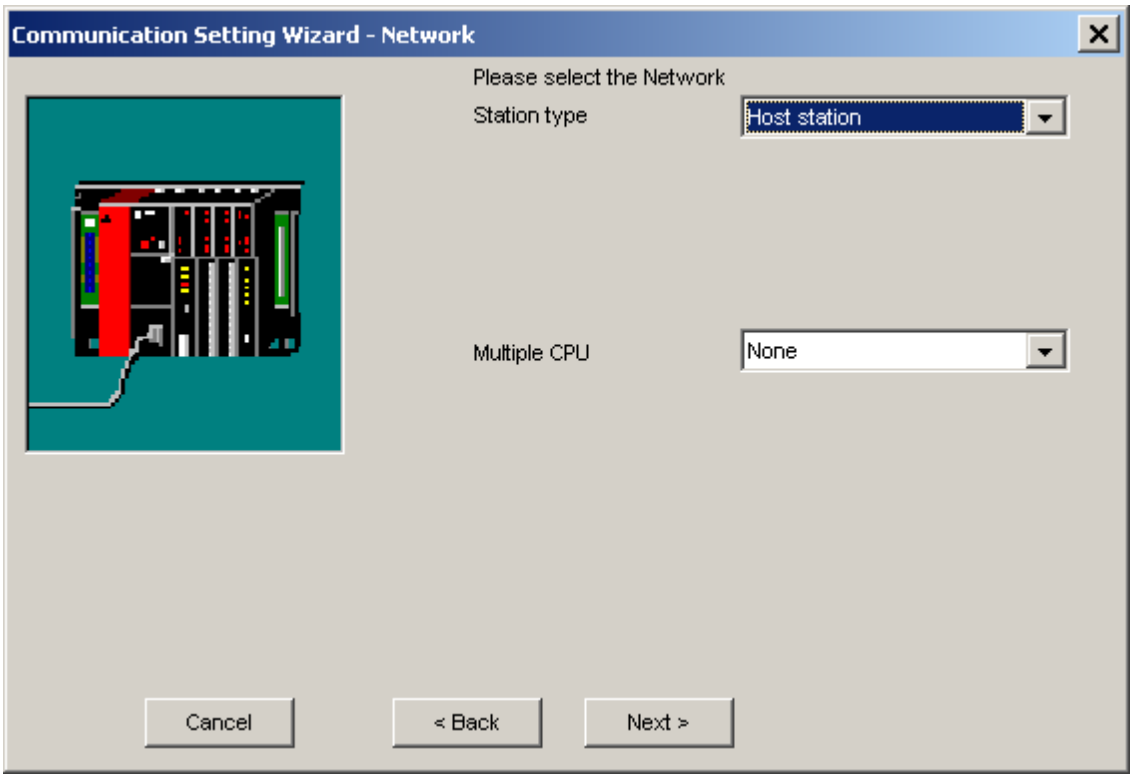
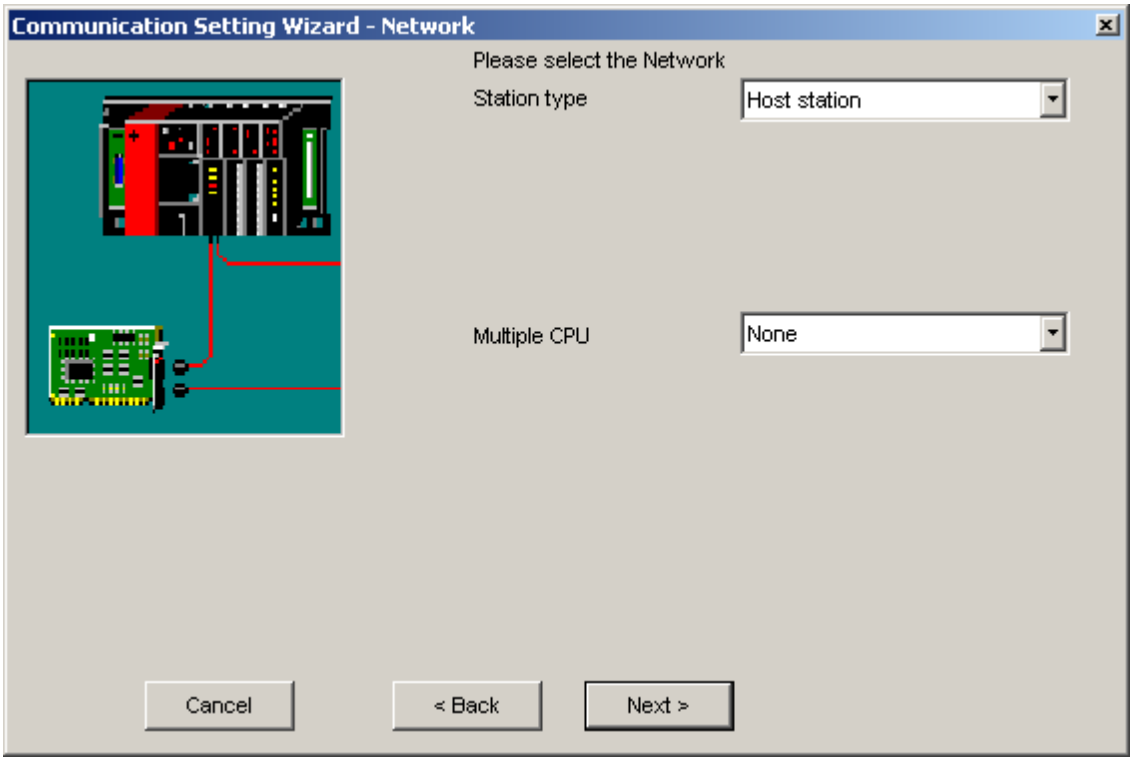
### 9.3.2.24 Network

#### Host station for CPU connections




If the target PLC contains multiple CPUs, the number of the target CPU must be selected in the 'Multiple CPU' parameter. For details see 'Appendix Multi-CPU'.
Pressing the <**Next**> button opens a page for entering a comment for the connection.

#### Host station for MELSECNET and CC-Link connections




If the target PLC contains multiple CPUs, the number of the target CPU must be selected in the

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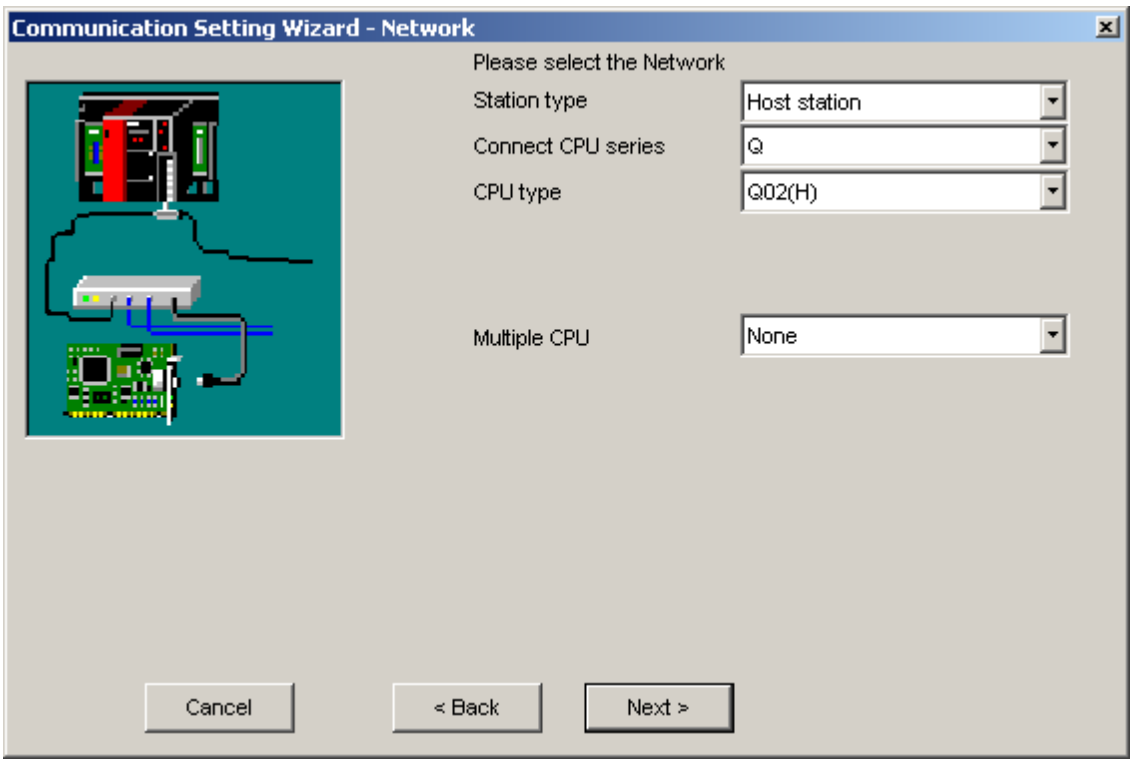
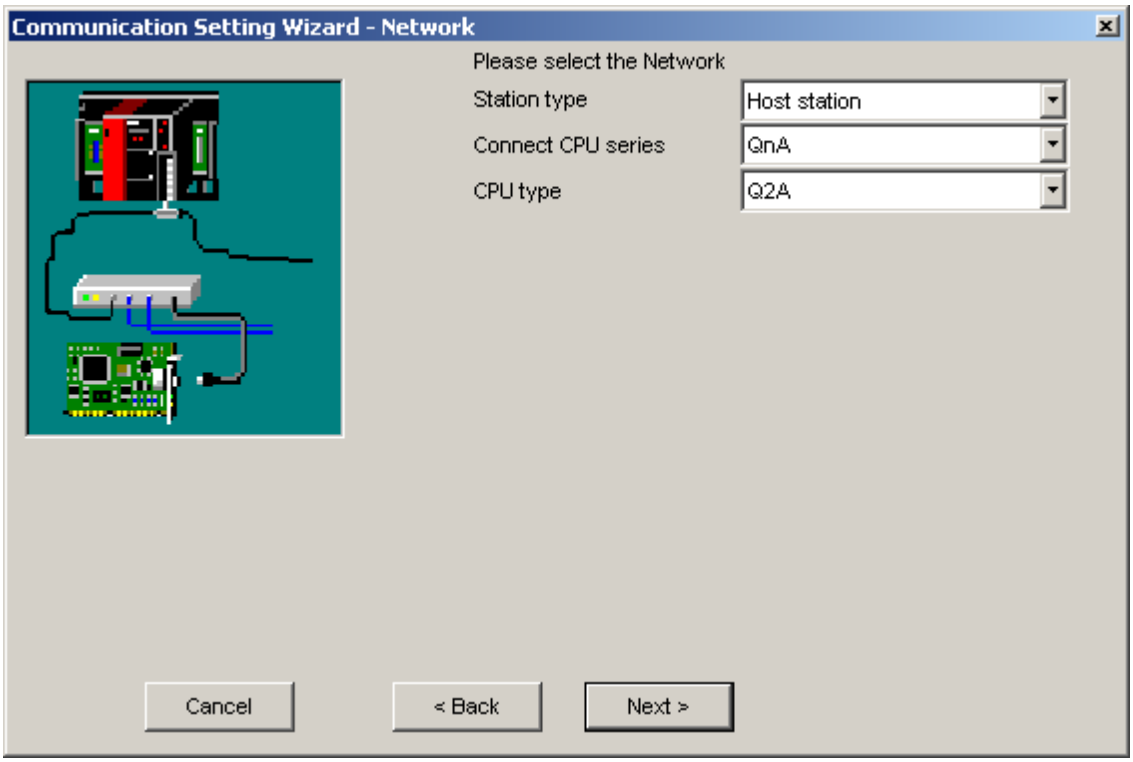
'Multiple CPU' parameter. For details see 'Appendix Multi-CPU'.
Pressing the <**Next**> button opens a page for entering a comment for the connection.

## Host station for C24 connections




Select the type of the target CPU. If the target PLC contains multiple CPUs, the number of the target CPU must be selected in the 'Multiple CPU' parameter. For details see 'Appendix Multi-CPU'.
Pressing the <**Next**> button opens a page for entering a comment for the connection.

## Host station for Ethernet connections

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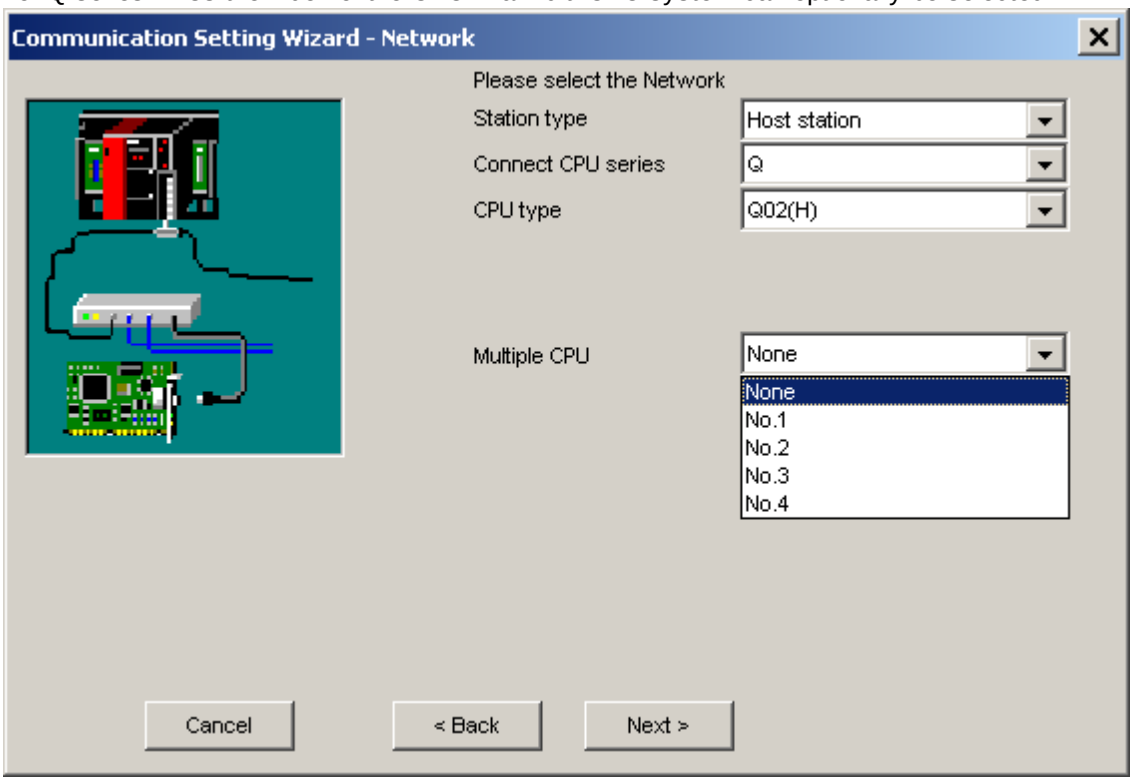
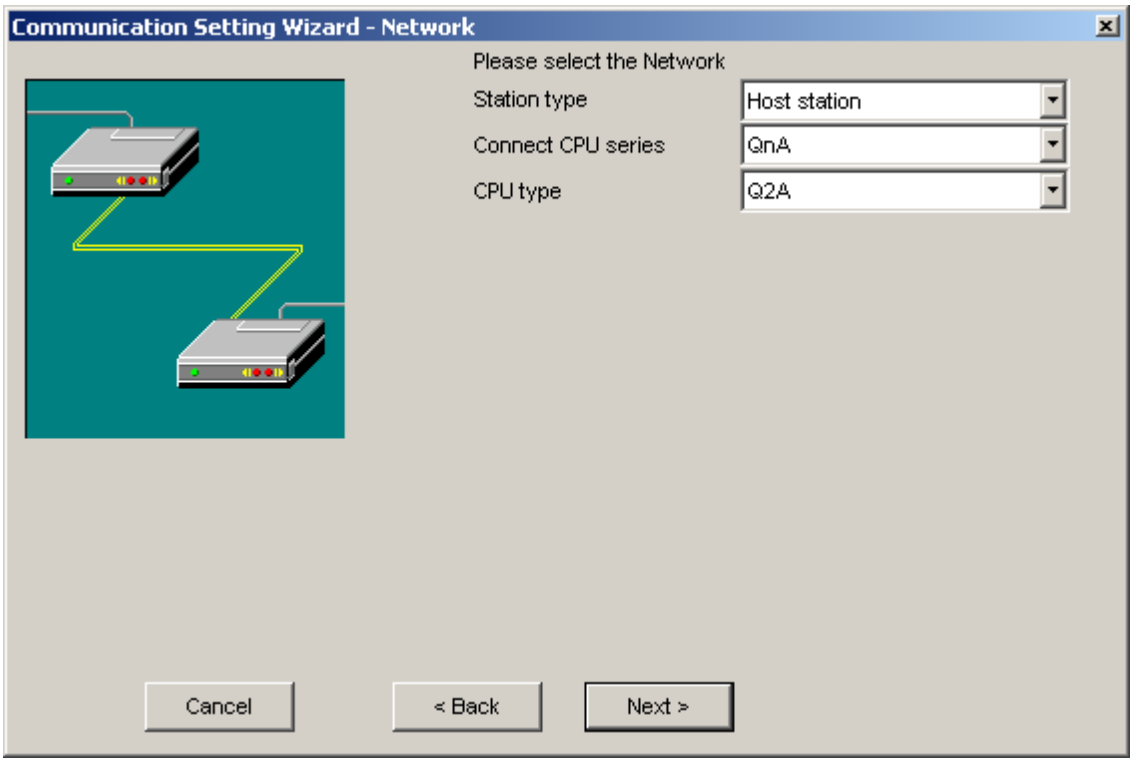
For Q-series PLCs the index of the CPU in a multi-CPU system can optionally be selected.




Select the type of the target CPU and press the <**Next**> button to open a page for entering a comment for the connection.

## Host station for modem connections




Pressing the <**Next**> button opens a page for entering a comment for the connection.

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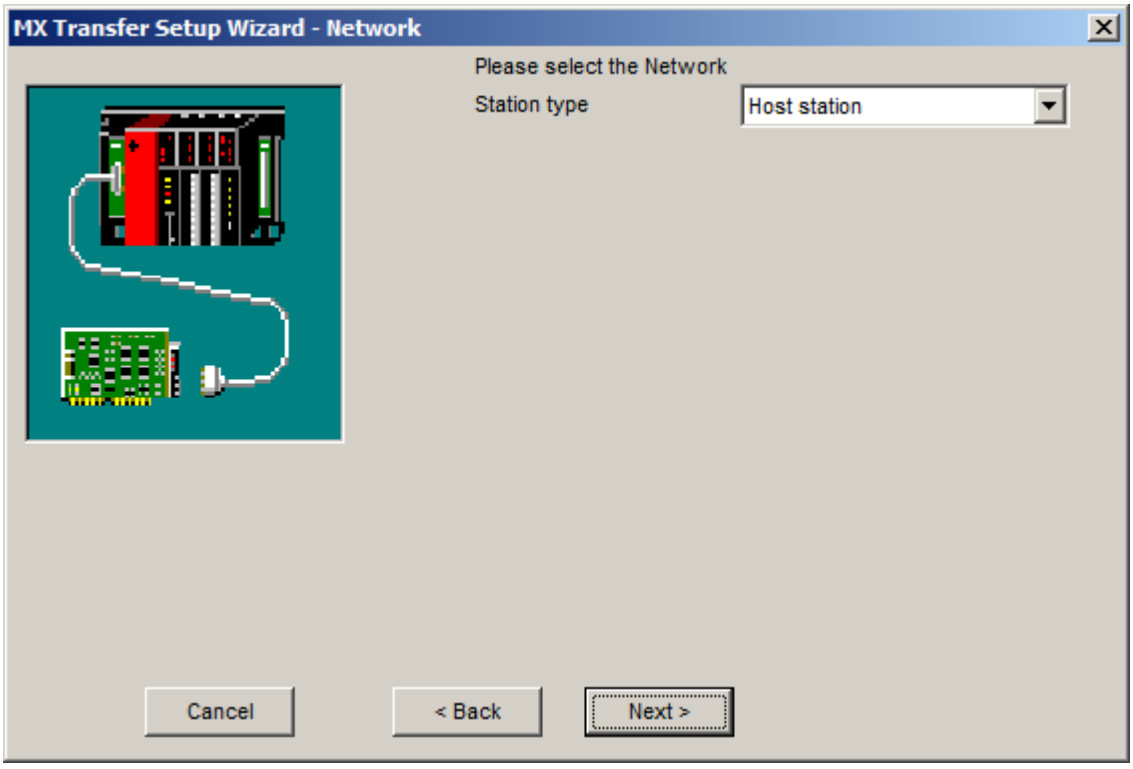
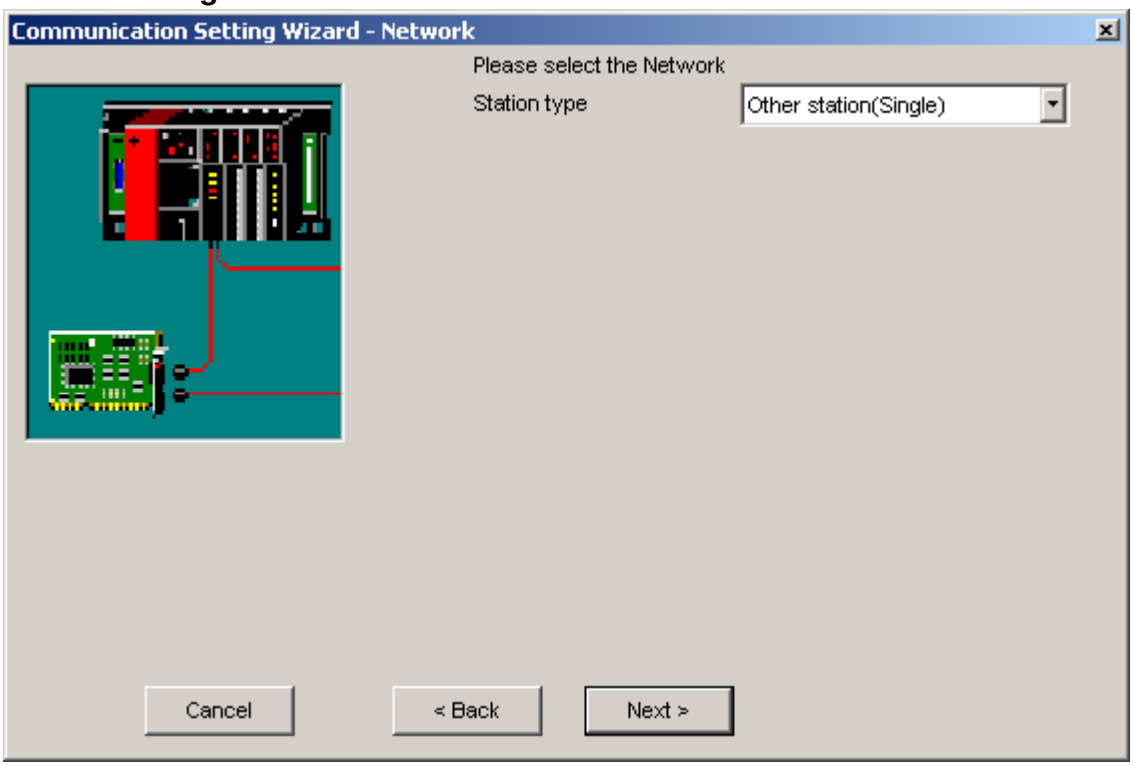
### Host Station for CPU Board Connections




### Station in single network




Pressing the <**Next**> button opens a page for entering the MELSECNET address of the target PLC.

### Station in coexisting network

#### For MELSECNET/10 interfaces

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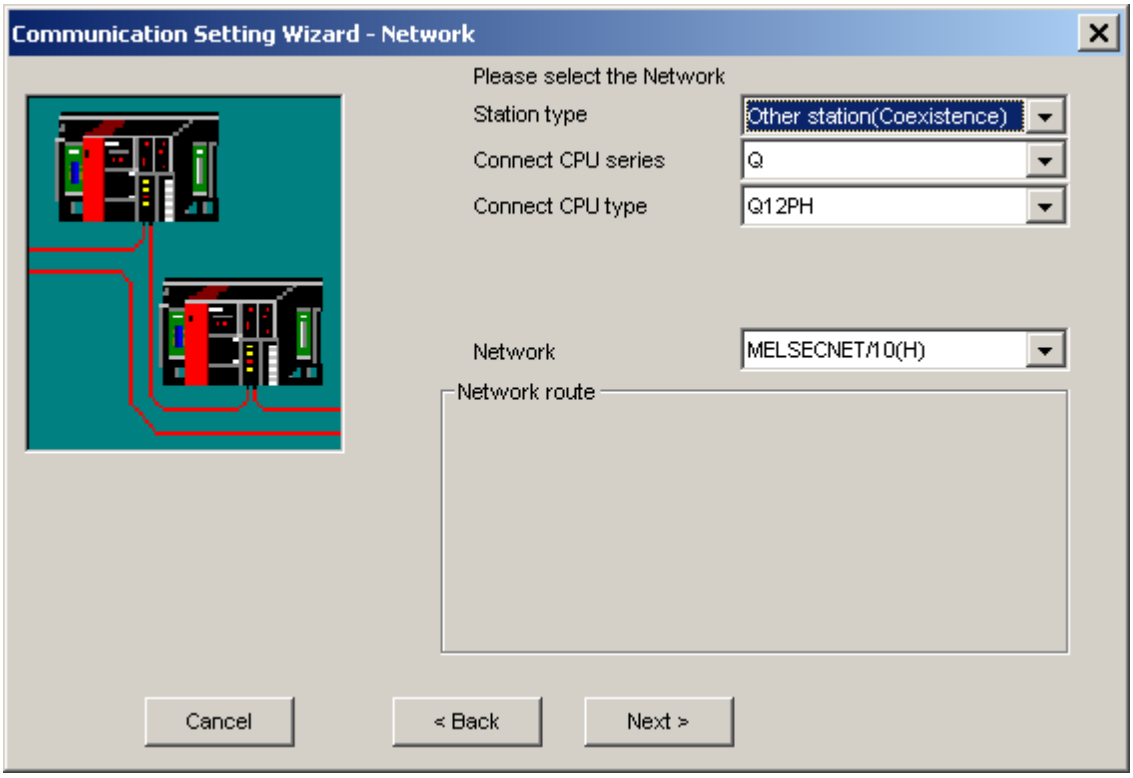
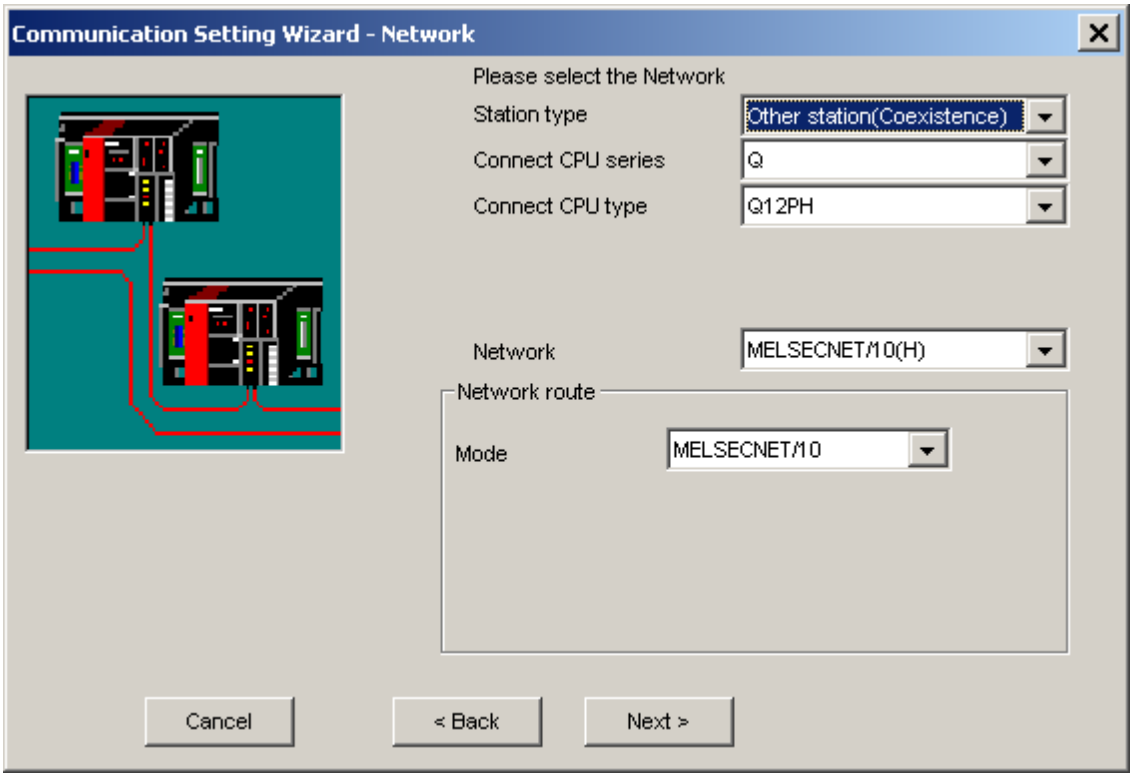



Select the type of the coexisting network and press the <**Next**> button to open a page for entering parameters of the target PLC in the coexisting network.

### For MELSECNET/H interfaces




Select the type of the coexisting network and press the <**Next**> button to open a page for entering parameters of the target PLC in the coexisting network.

### For CC-Link interfaces

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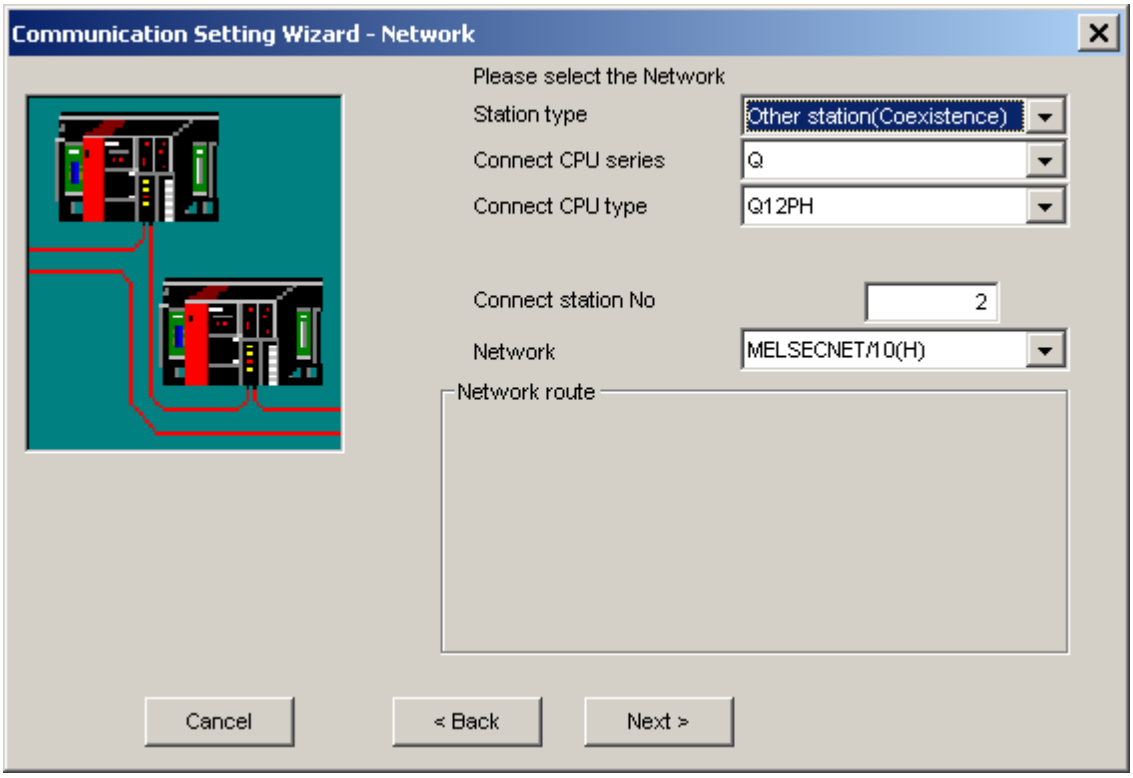


| Parameter | Values | Description |
|---|---|---|
| Connect station no. | 0 - 64 | station number of the CC-link module in the target station |

Select the type of the coexisting network and press the <**Next**> button to open a page for entering parameters of the target PLC in the coexisting network.

### For CC-Link IE interfaces

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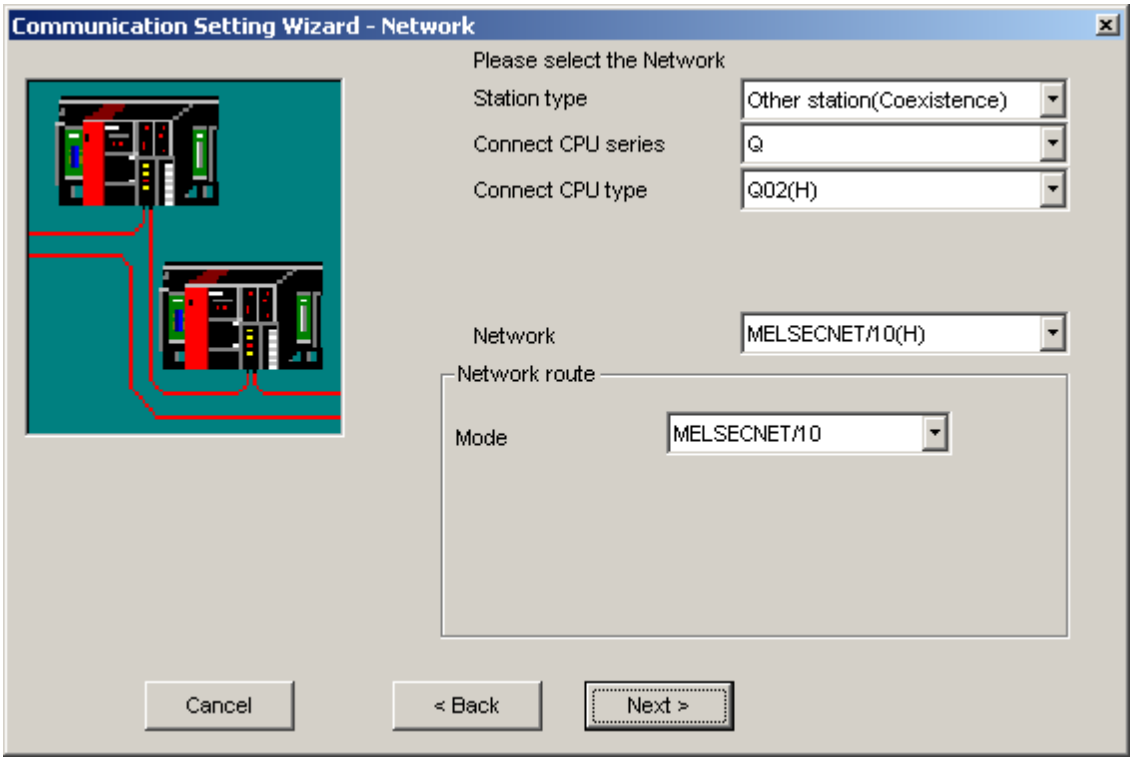
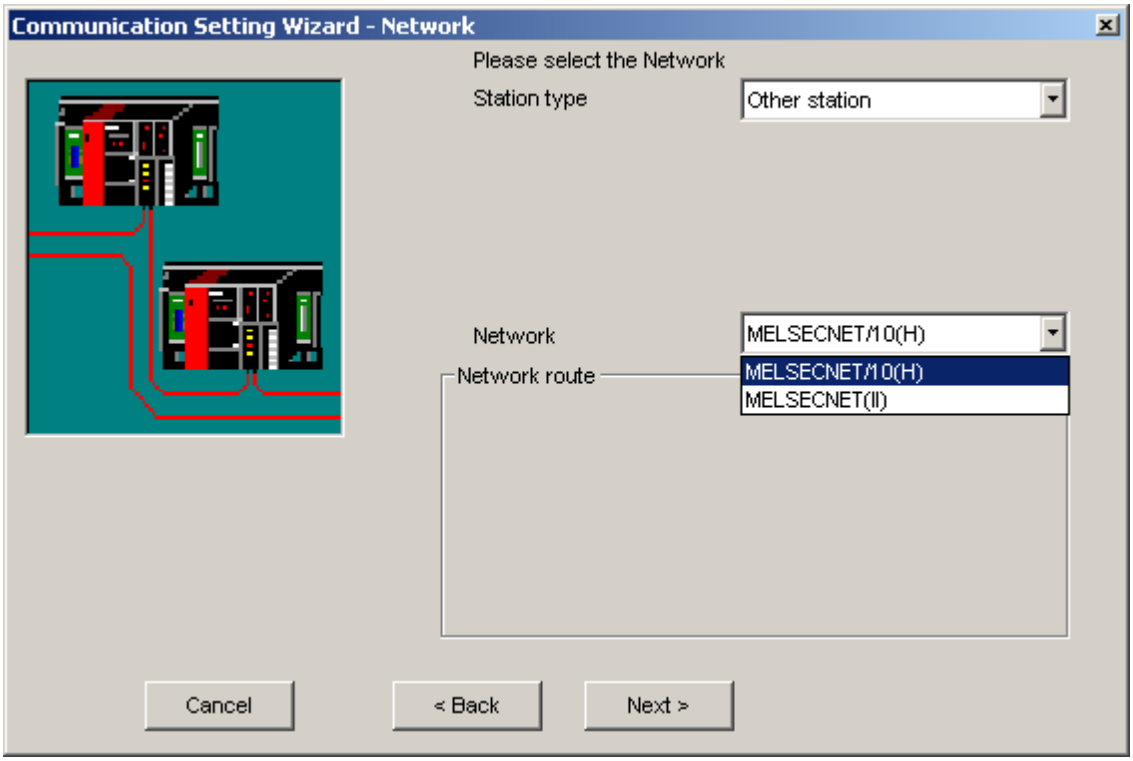



Select the type of the coexisting network and press the <**Next**> button to open a page for entering parameters of the target PLC in the coexisting network.

## Station in MELSECNET/10 network




Select the type of the network, to which the target PLC is connected. Additionally the mode may also be selectable.

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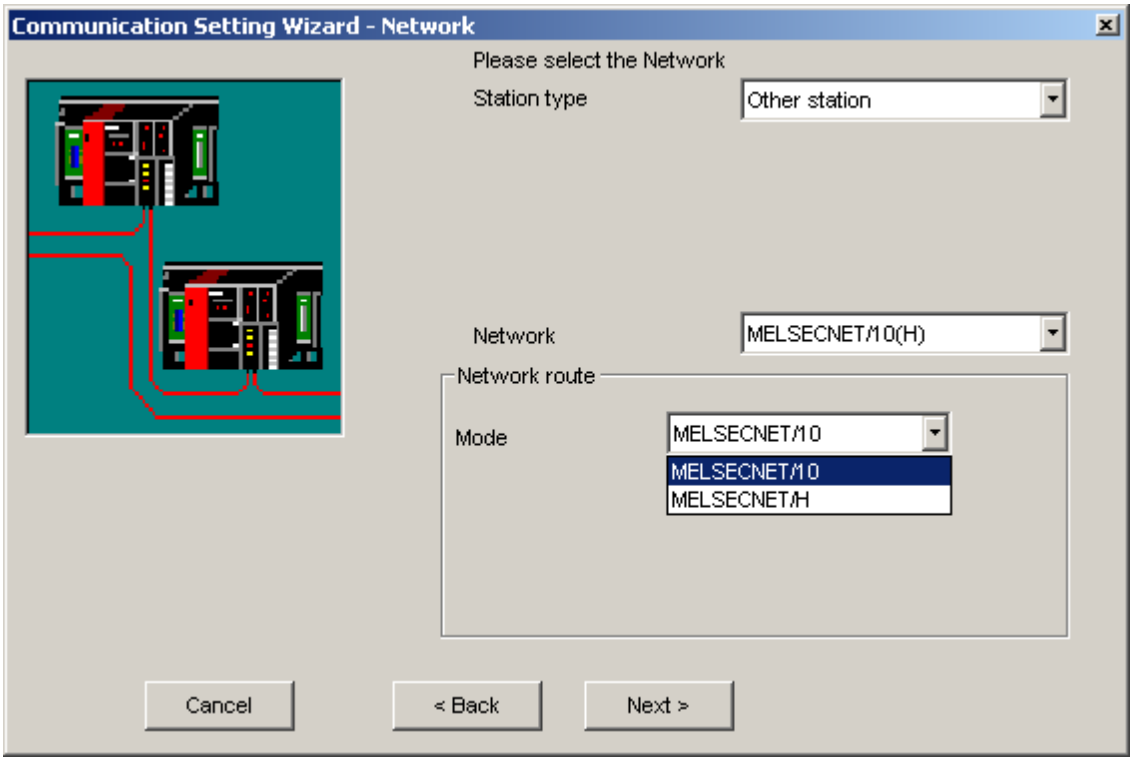
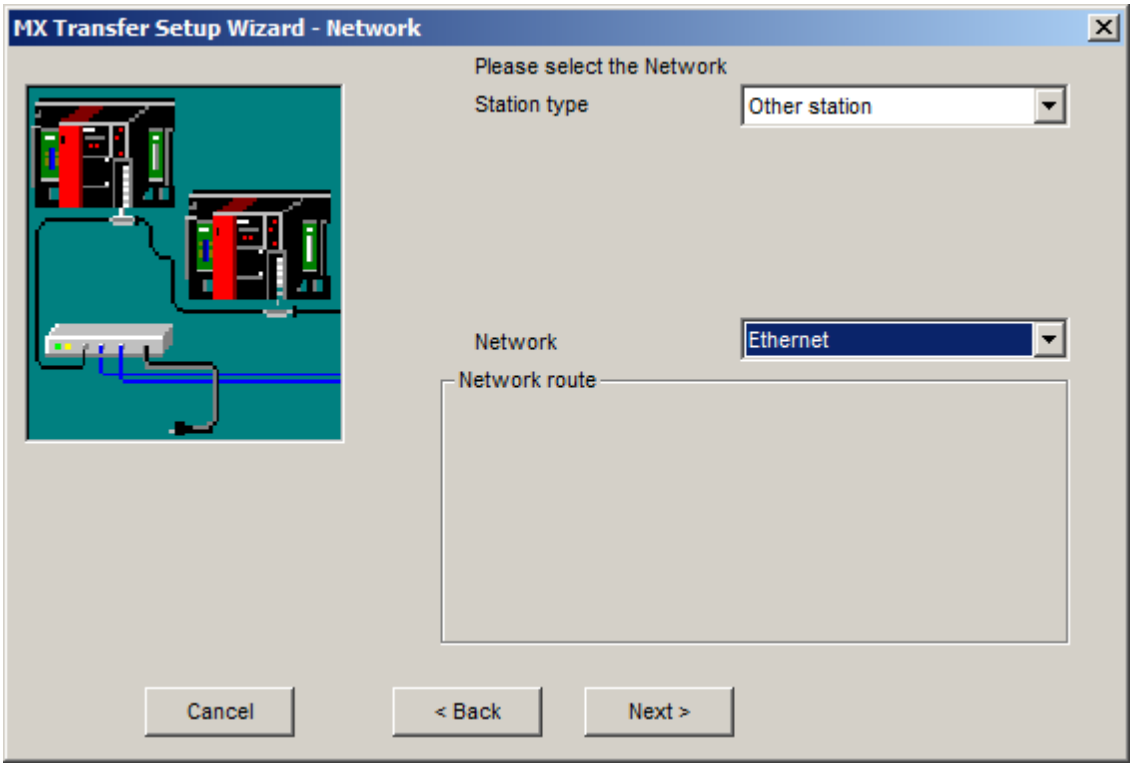



Pressing the <**Next**> button opens a page for entering the MELSECNET address of the target PLC.

### Station in Ethernet network




### Station in MELSECNET(II) network

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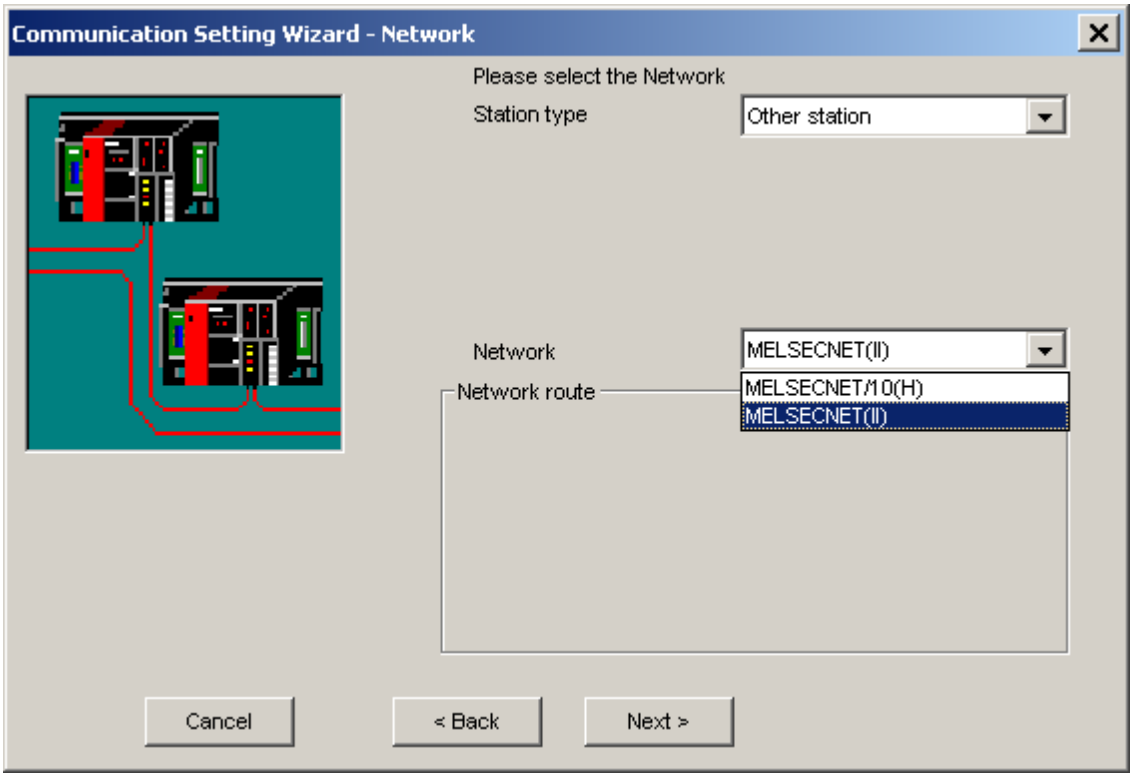
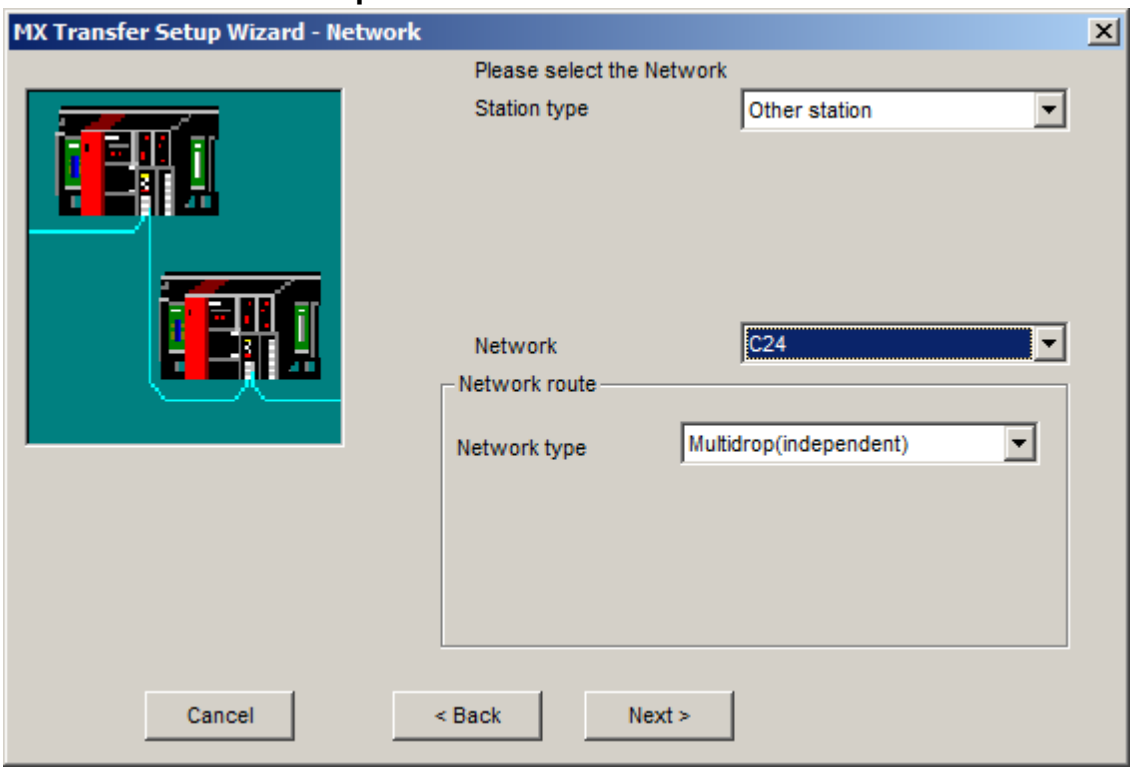



Pressing the <**Next**> button opens a page for entering the MELSECNET address of the target PLC.

| | |
|---|---|
| | **Note:**<br>When access is made to the QnACPU, AnUCPU, QCPU (A mode) or motion controller CPU via the MELSECNET(II), the device range is equivalent to that of the AnACPU. |

## Station in C24 multi drop network




Pressing the <**Next**> button opens a page for entering the station address of the target PLC in multi

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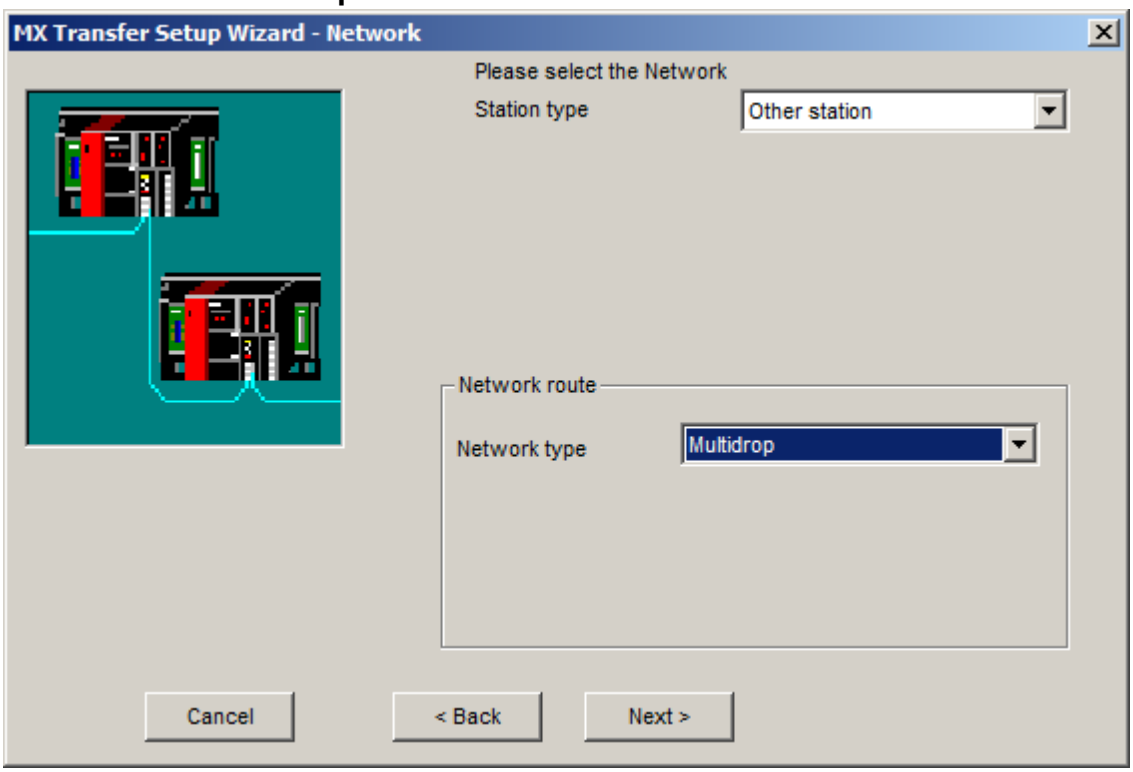
drop network.

### Station in FX multi drop network




Pressing the <**Next**> button opens a page for entering the station address of the target PLC in multi drop network.

### Network with C24 station

| Parameter | Values | Description |
|---|---|---|
| Network type | C24 | fixed |
| I/O address | I/O number divided by 0x10 | module I/O address of connected station |

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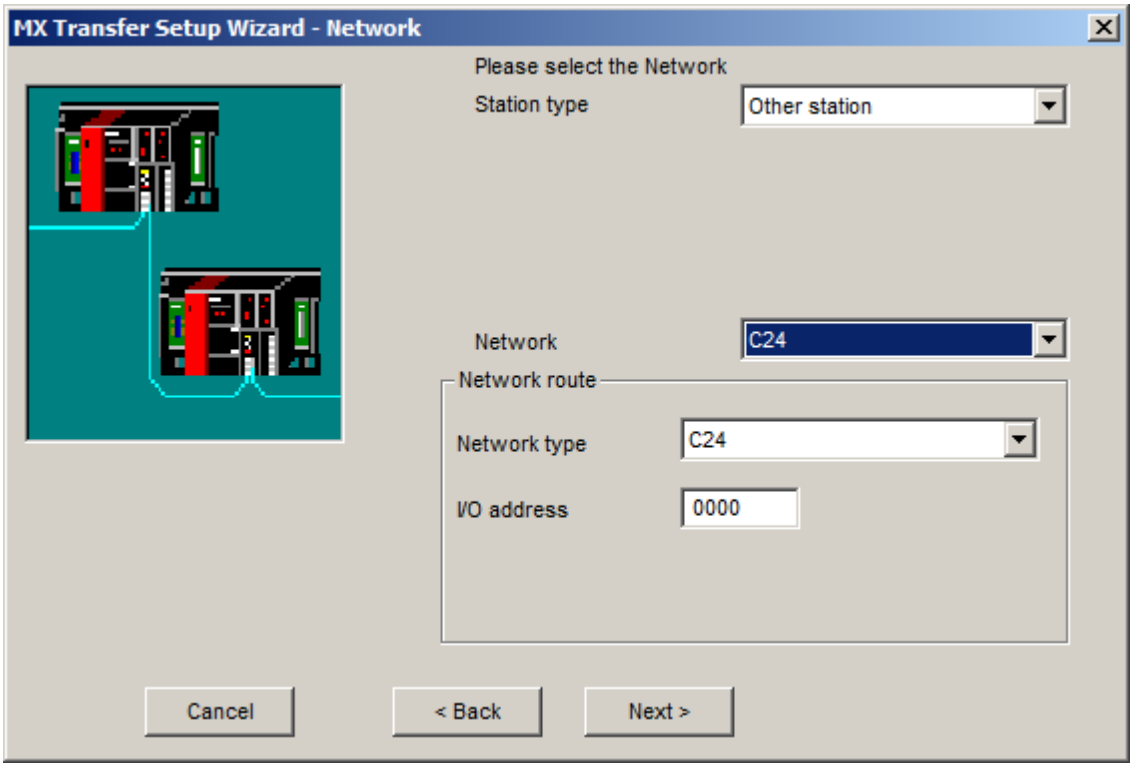
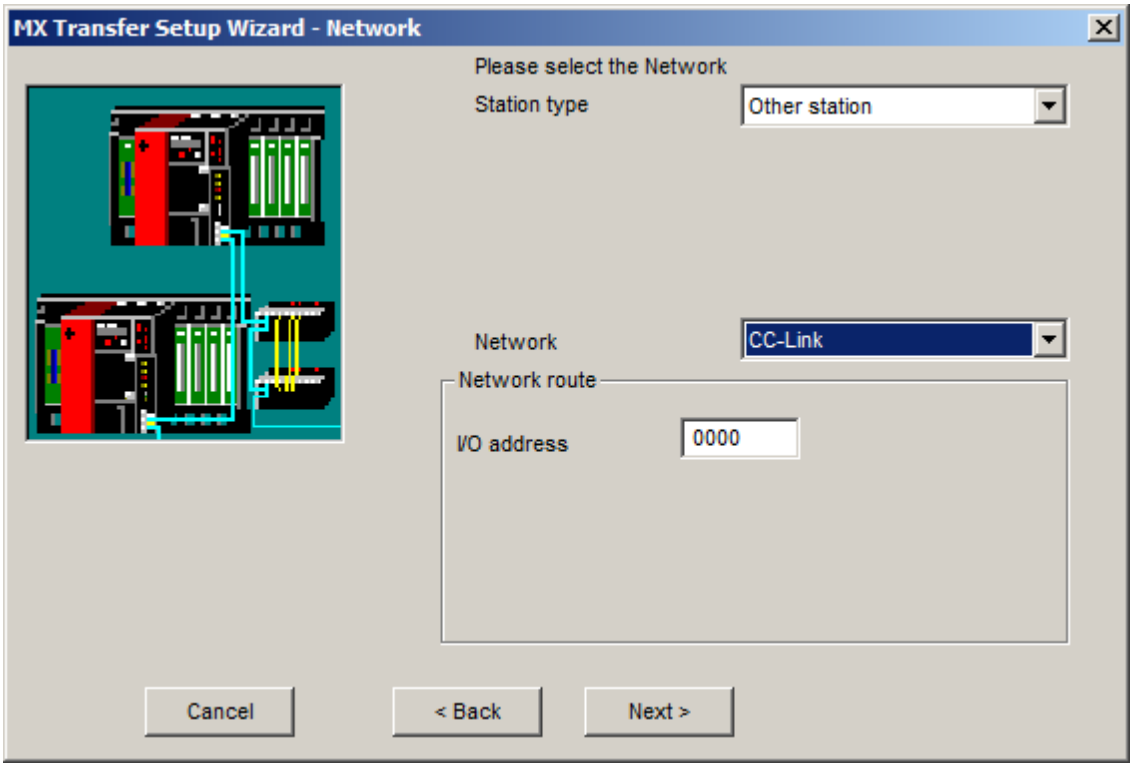



## Network with CC-Link station




| Parameter | Values | Description |
|---|---|---|
| I/O address | I/O number divided by 0x10 | module I/O address of connected station |

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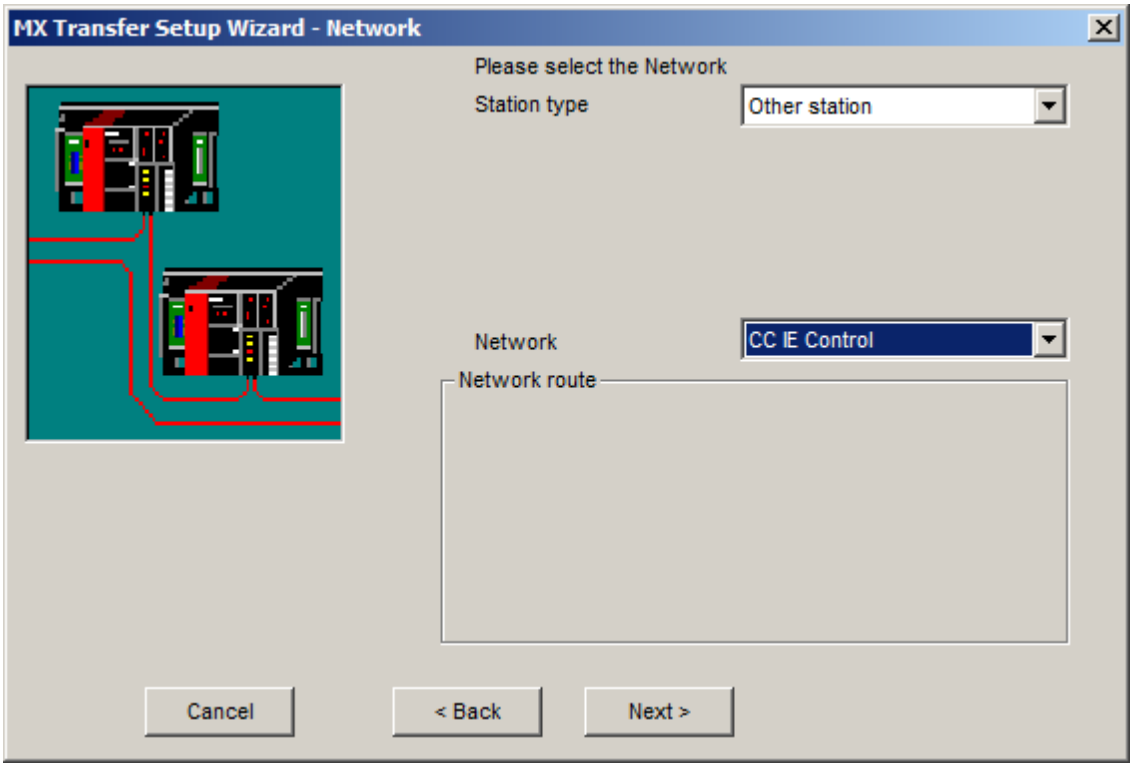
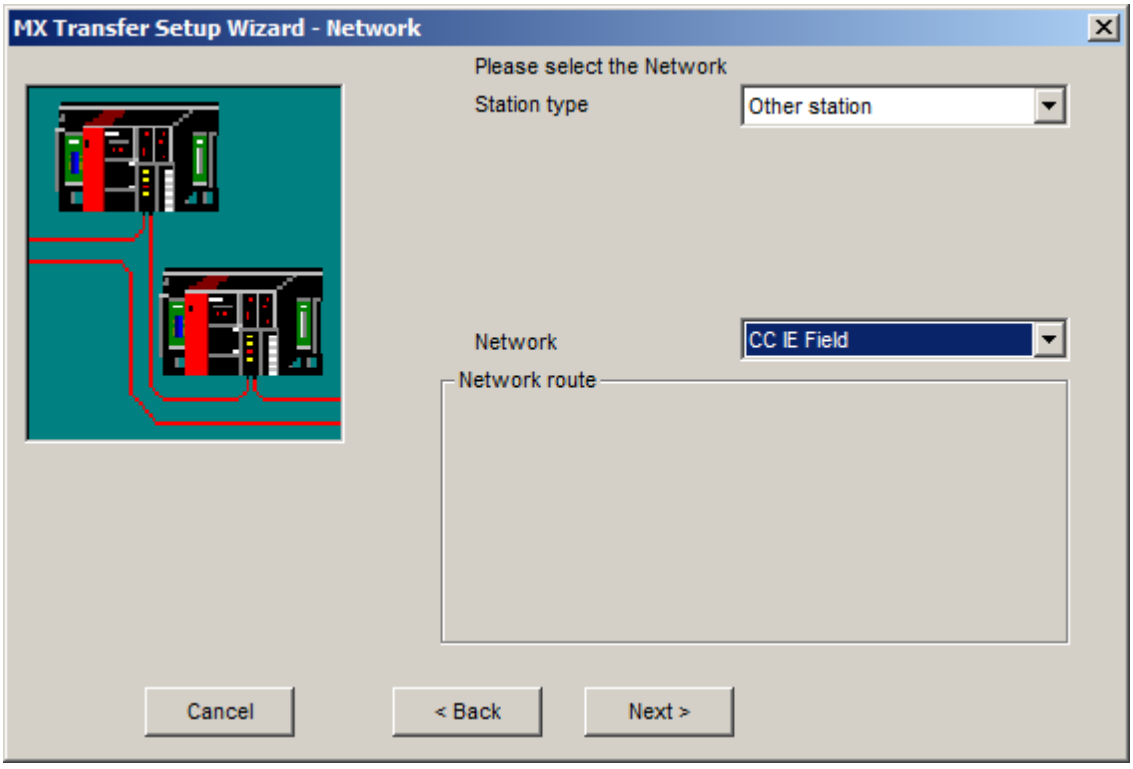
## Network with CC-Link IE Control




## Network with CC-Link IE Field

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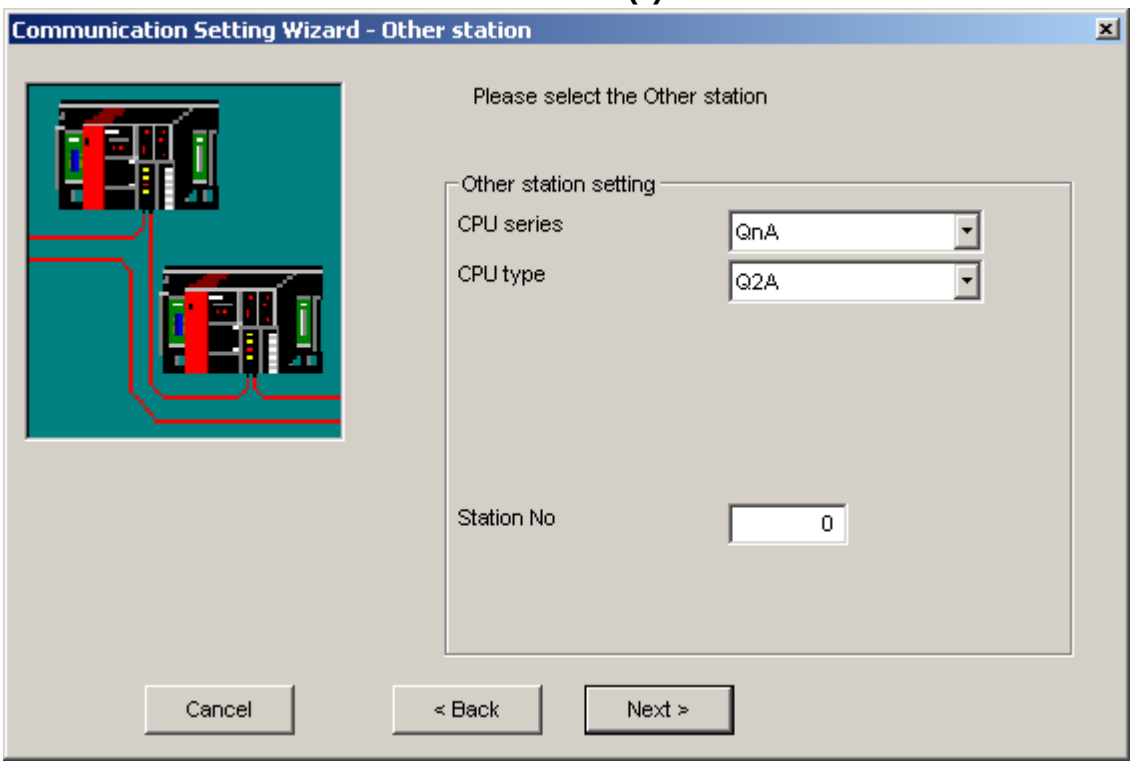
### 9.3.2.25 Other Station

This page is used to provide type and network address information of the target PLC in a multi-layered network.

| Parameter | Values | Description |
|---|---|---|
| CPU series | Q, QnA, A, L depending on previous choices | series of the CPU type |
| CPU type | see list of supported CPU types | type of PLC CPU module |
| Network No | 1 - 239 | network number of the target interface |
| Station No. | 1 - 64 | station number of the target interface |

## Station in same network for MELSECNET(II)




Pressing the <**Next**> button opens a page for entering a comment for the connection.

## Station in same network for C24 or FX

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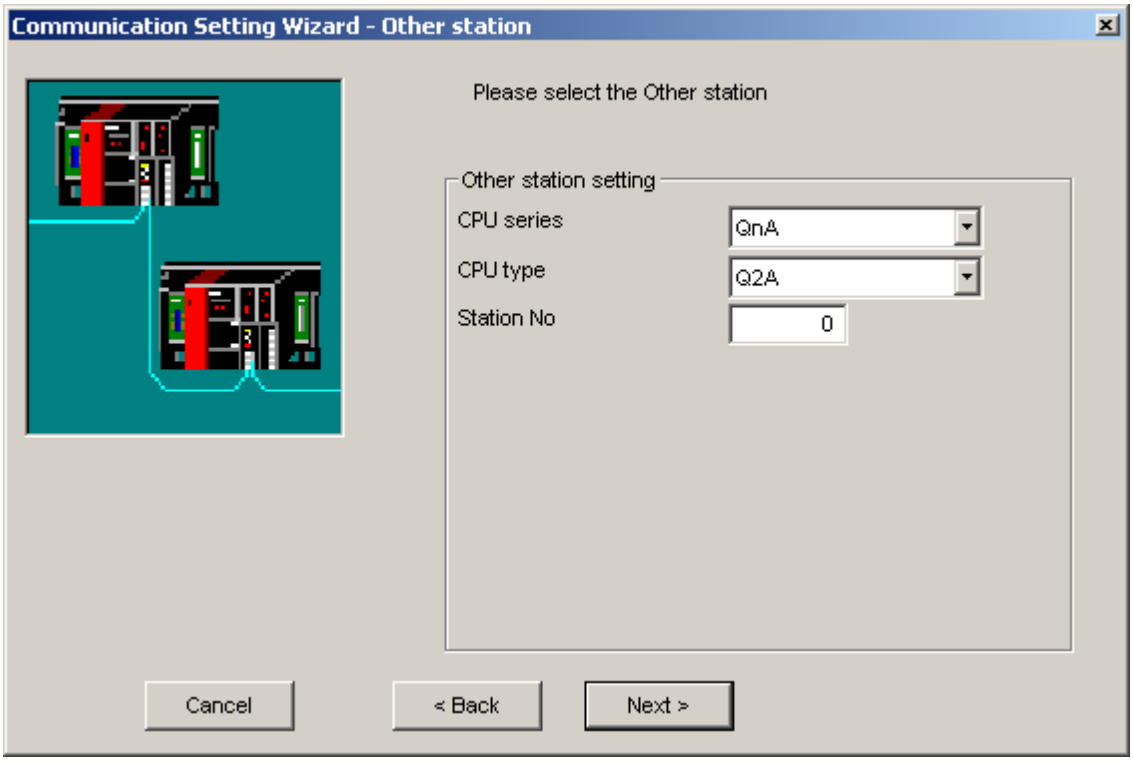
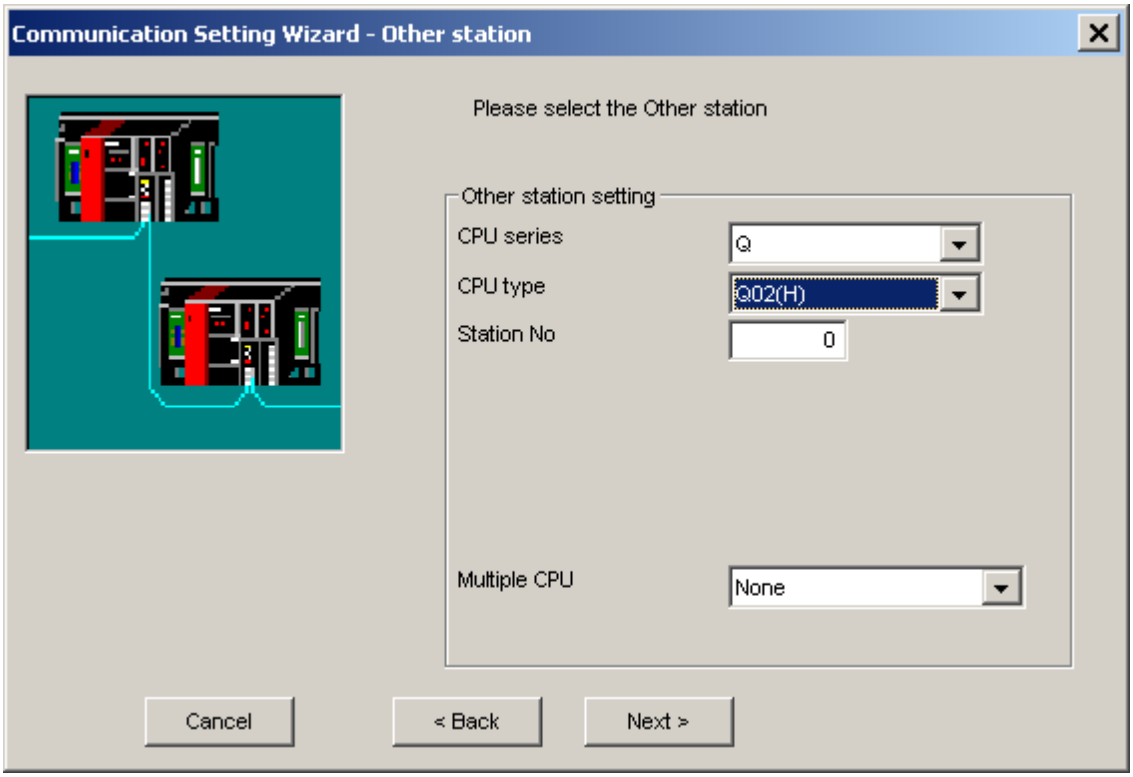



For Q-series PLCs the index of the CPU in a multi-CPU system can optionally be selected.




Pressing the <**Next**> button opens a page for entering a comment for the connection.

## Station in same network for CC-Link

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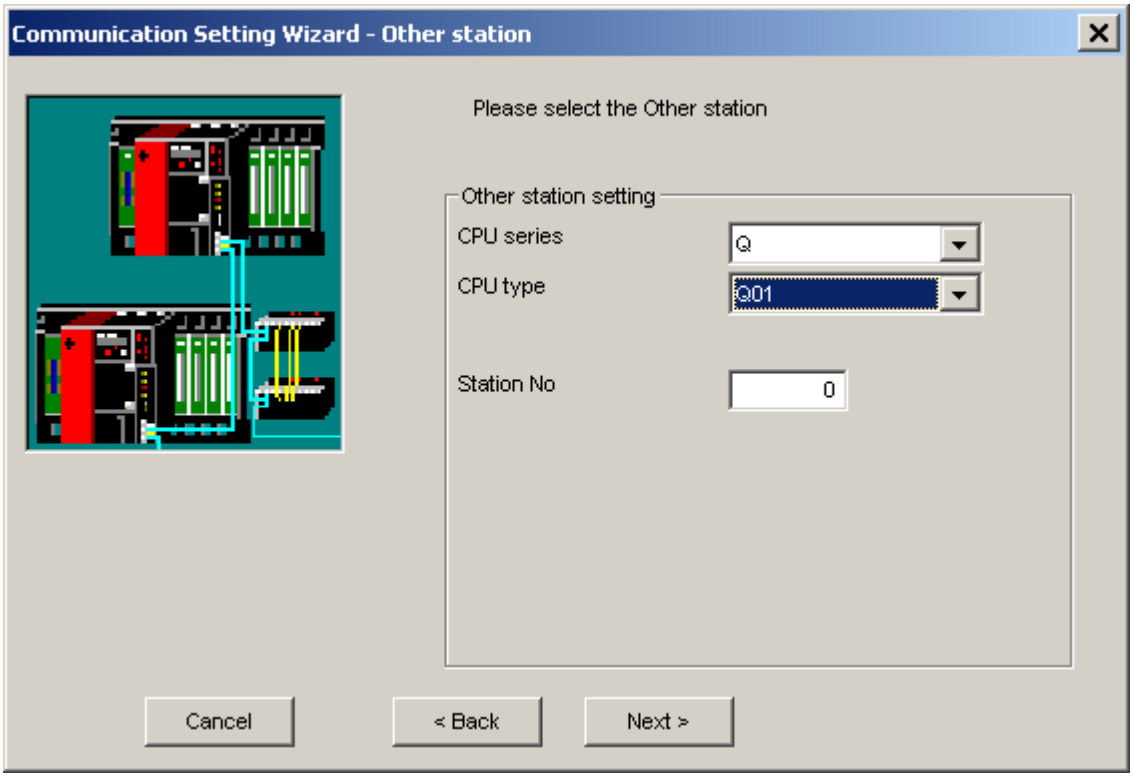
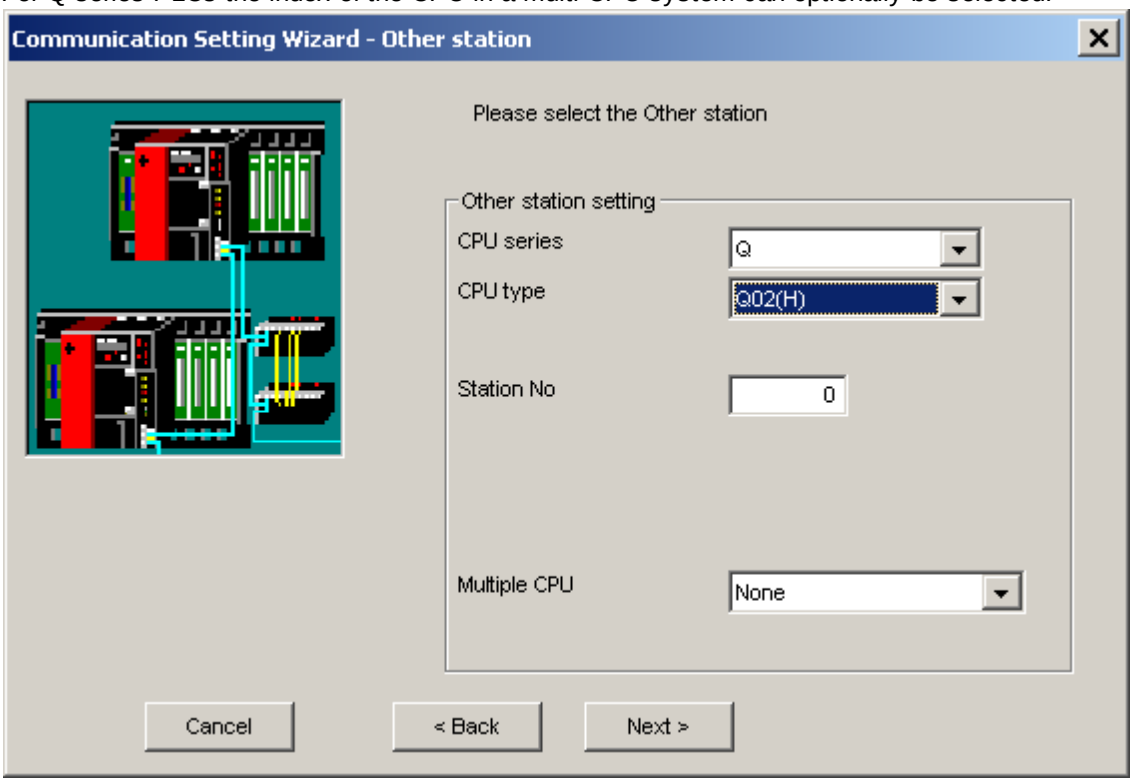
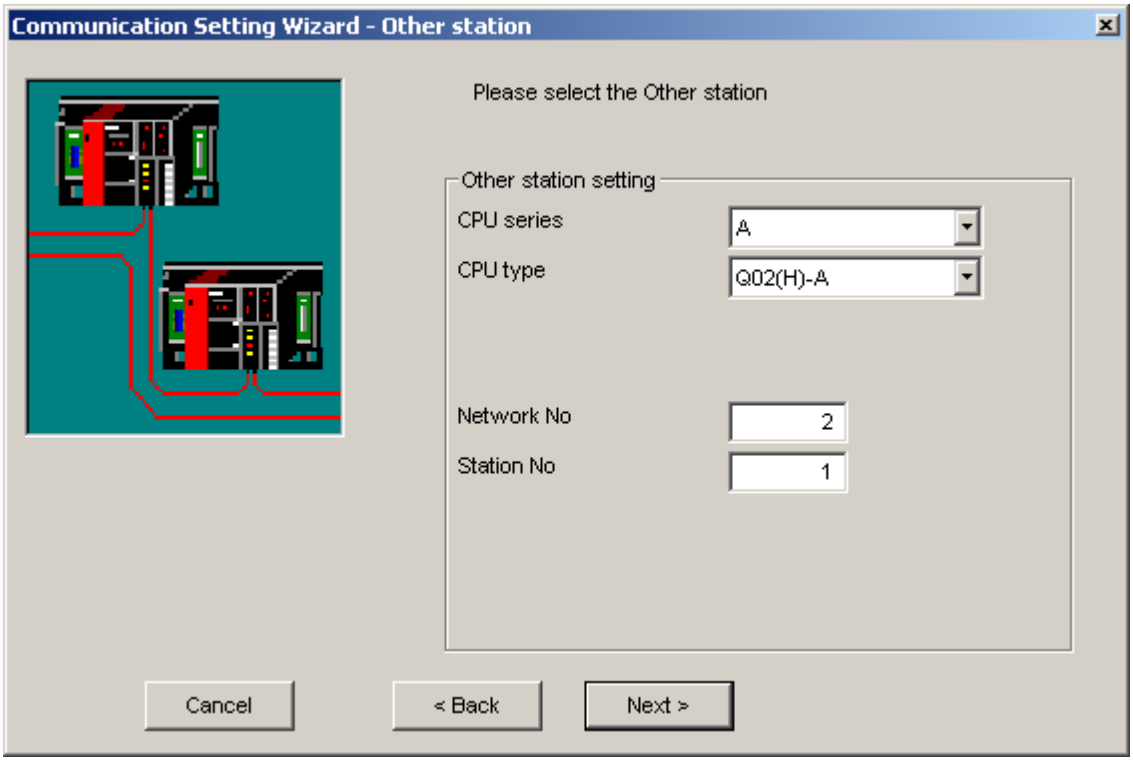



For Q-series PLCs the index of the CPU in a multi-CPU system can optionally be selected.

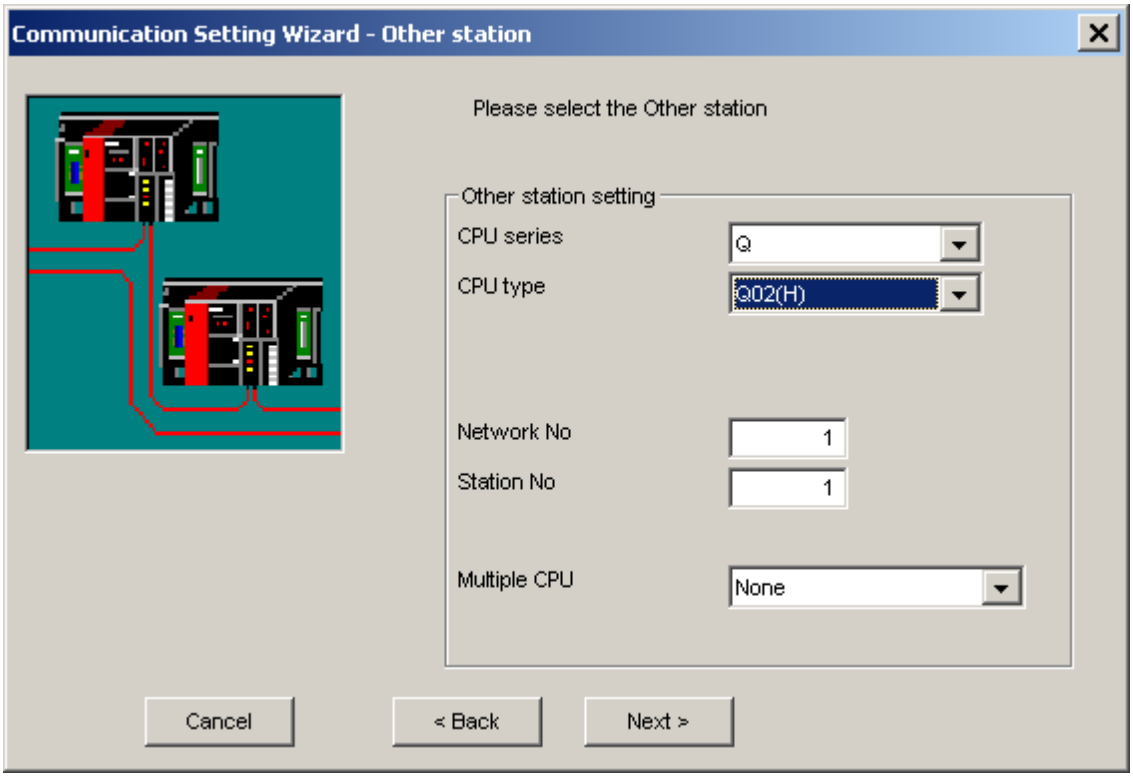



Pressing the <**Next**> button opens a page for entering a comment for the connection.

## Station in same or different network




For Q-series PLCs the index of the CPU in a multi-CPU system can optionally be selected.




If the target PLC is in a different network, the network number of that network must be provided additionally to the station number of the target PLC.
Pressing the <**Next**> button opens a page for entering a comment for the connection.

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### 9.3.2.26 GOT Side Settings

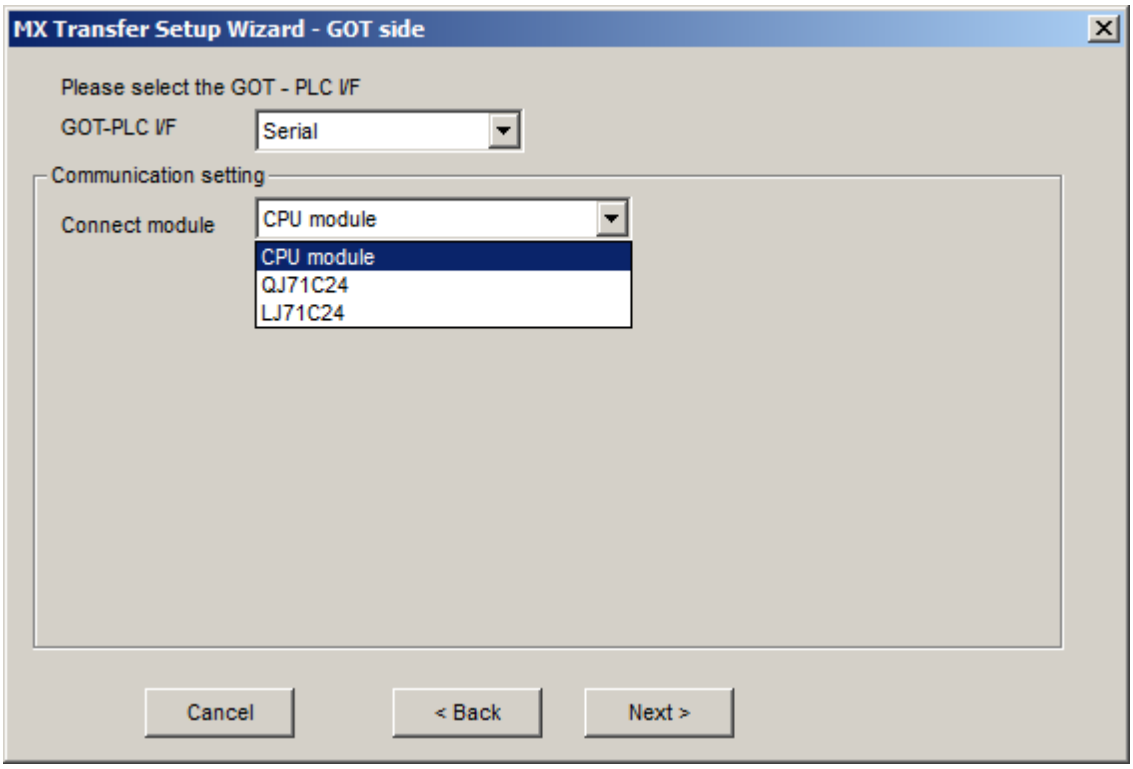
# PC Serial Interfaces (USB and RS232)

For USB and RS232 serial connections between PC and GOT the following interfaces of the GOT can be used to connect to the PLC

- GOT Serial Interface
- GOT Bus Interface
- GOT Ethernet Interface

The interfaces, which are actually available on the GOT, depend on the specified GOT hardware used.

## GOT Serial Interface




| Parameter | Values | Description |
|---|---|---|
| Connect module | CPU module<br>QJ71C24<br>LJ71C24 | type of connected unit on the PLC side |

## GOT Bus Interface

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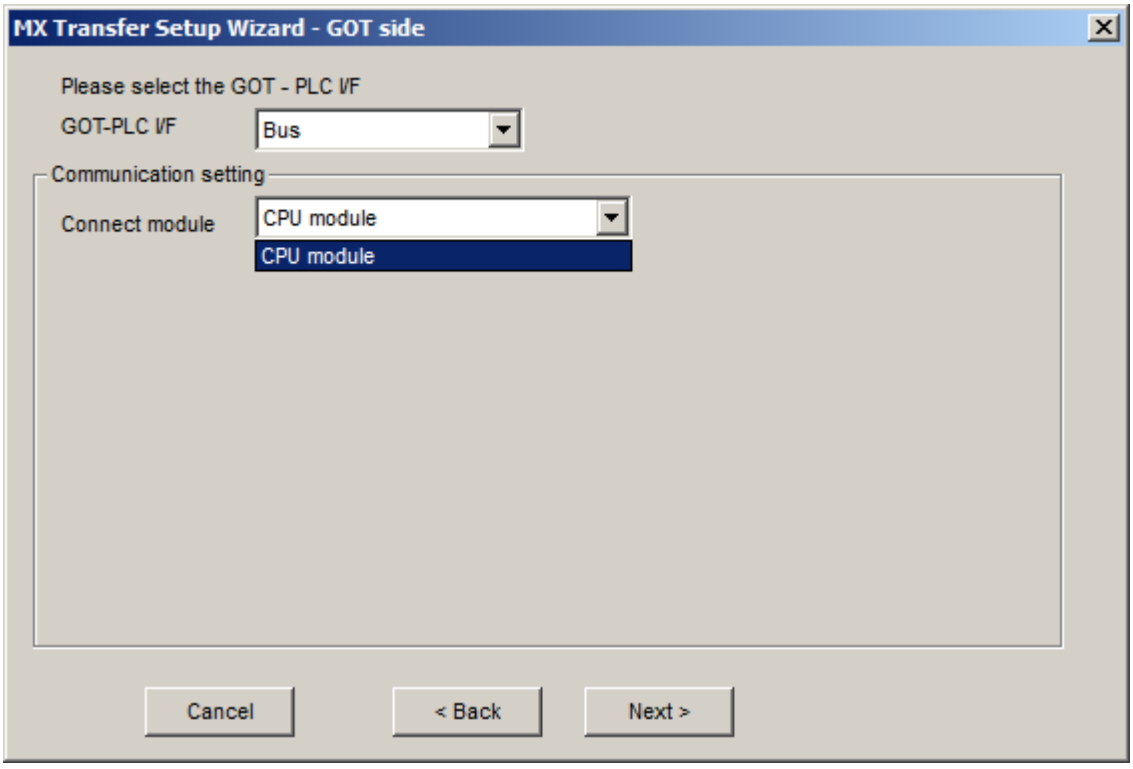
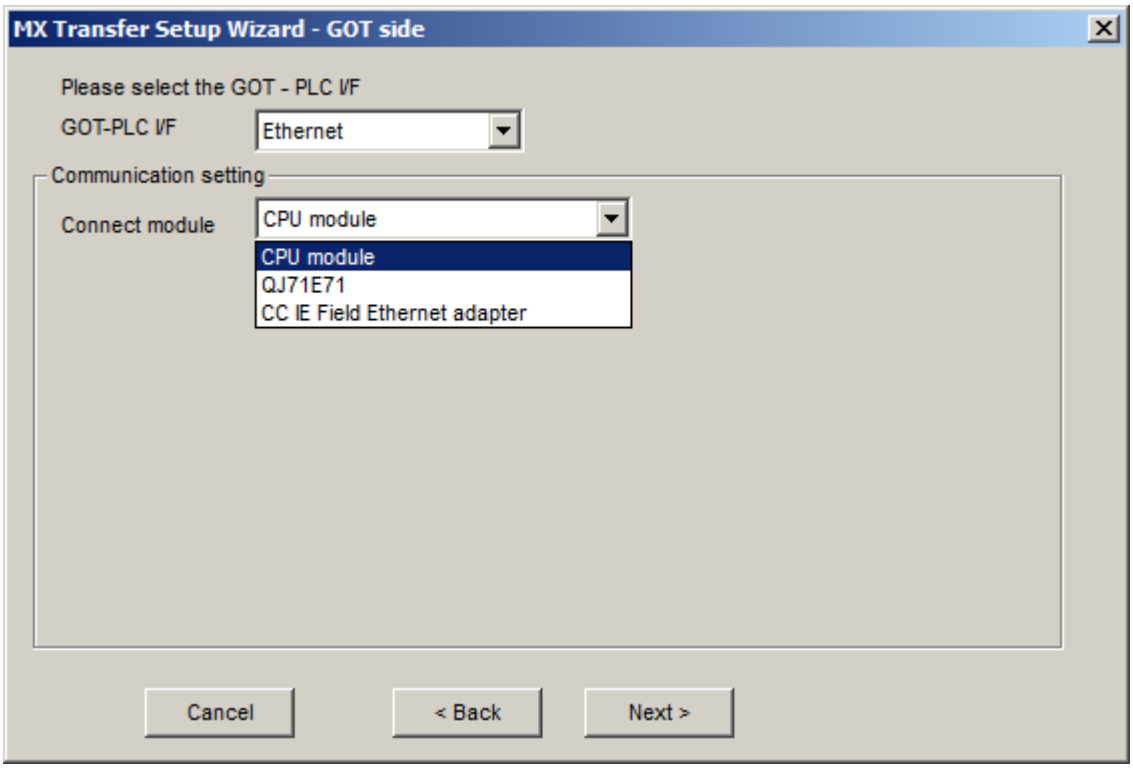



## GOT Ethernet Interface

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| Parameter | Values | Description |
|---|---|---|
| Connect module | CPU module<br>QJ71E71<br>CC IE Field Ethernet adapter | type of connected unit on the PLC side |

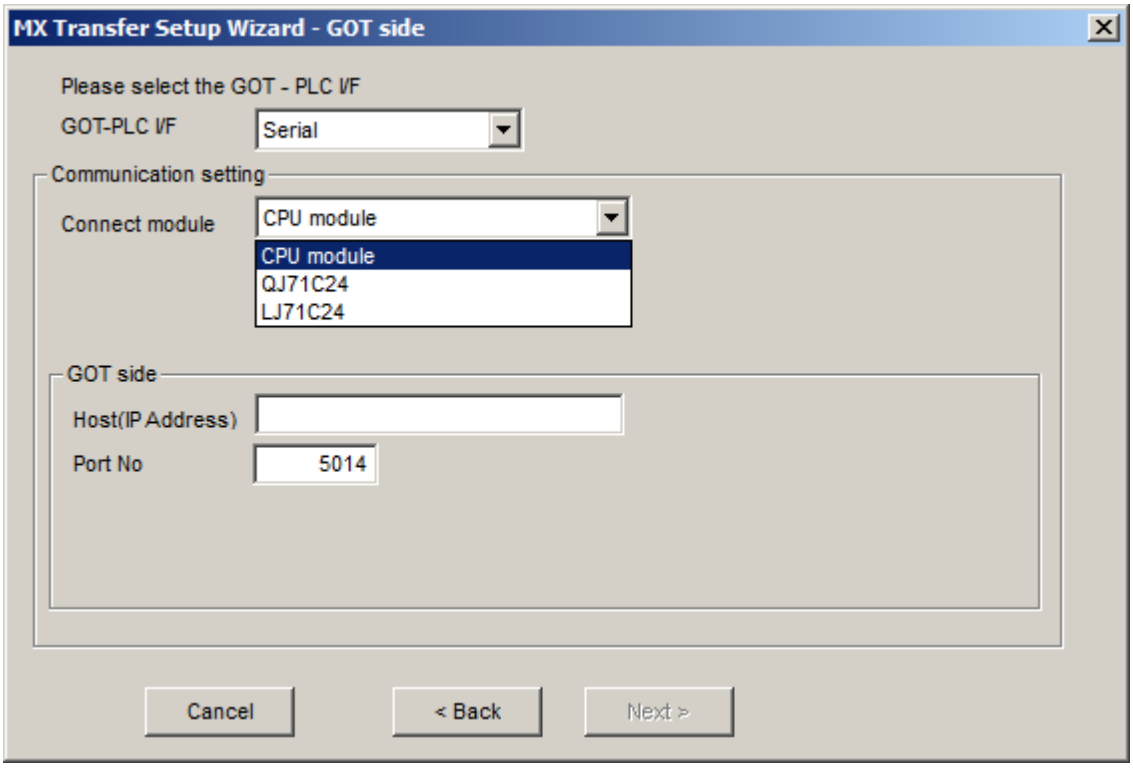
## PC Ethernet Interface

For Ethernet connections between PC and GOT the following interfaces of the GOT can be used to connect to the PLC

- GOT Serial Interface
- GOT Bus Interface

The interfaces, which are actually available on the GOT, depend on the specified GOT hardware used.

### GOT Serial Interface




| Parameter | Values | Description |
|---|---|---|
| Connect module | CPU module<br>QJ71C24<br>LJ71C24 | type of connected unit on the PLC side |
| Host (IP Address) | IP address or host name | IP address of the GOT ethernet interface |
| Port No | 1024 - 65534 | port number on the GOT for the PC connection |

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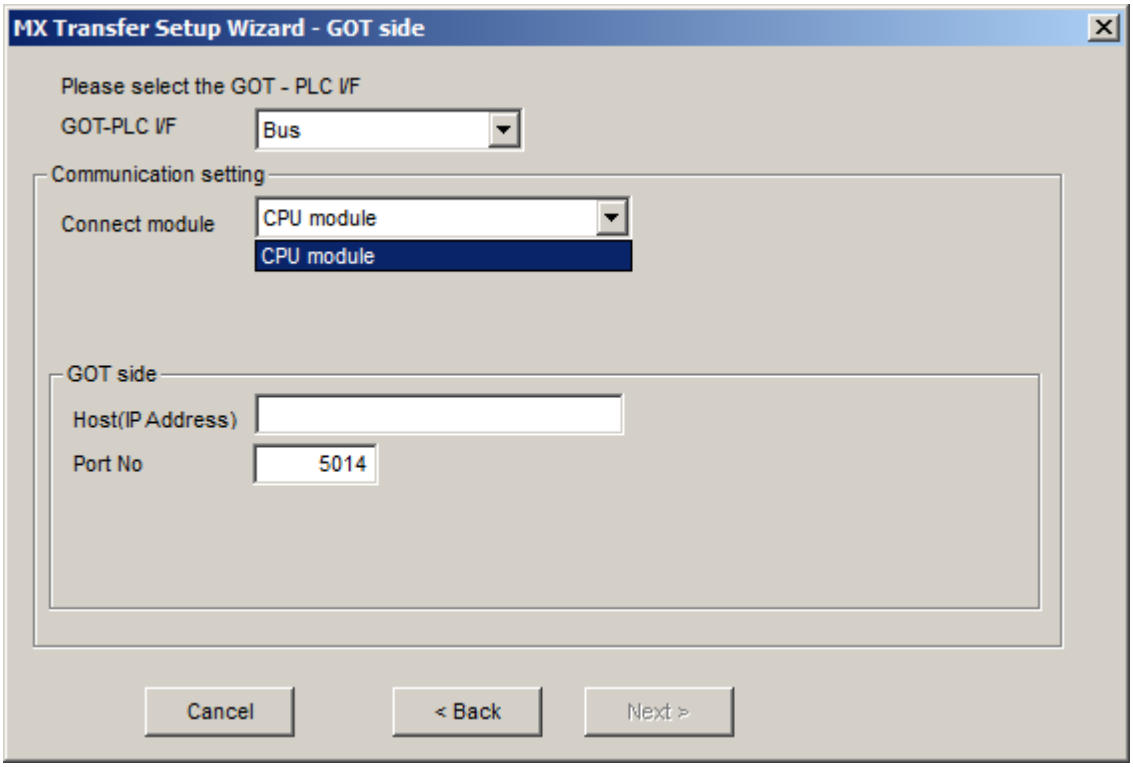
## GOT Bus Interface




| Parameter | Values | Description |
|---|---|---|
| Connect module | CPU module | type of connected unit on the PLC side |
| Host (IP Address) | IP address or host name | IP address of the GOT ethernet interface |
| Port No | 1024 - 65534 | port number on the GOT for the PC connection |

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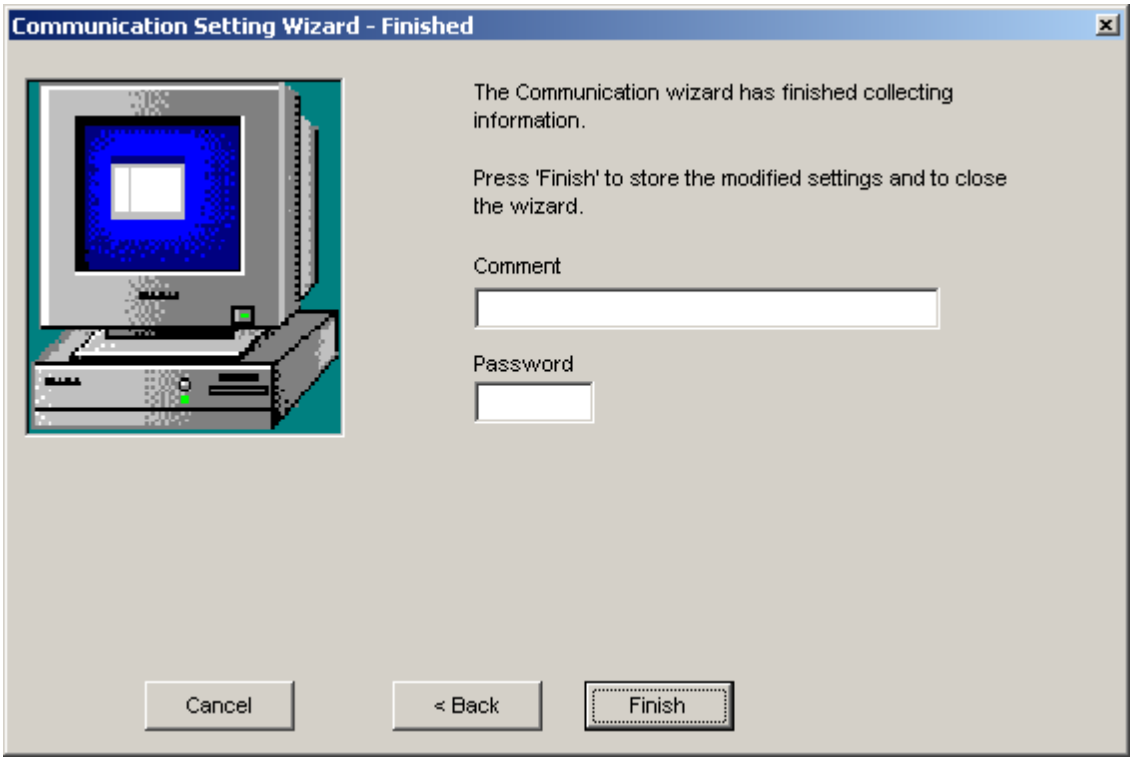
### 9.3.2.27 Enter Comment

Enter a comment to describe the configured PLC connection and test the PLC connection with the current settings.




For modem connections to QJ71C24 and QJ71CMO modules a password may be required in order to gain access to the CPU. Enter the password, which has been set in the CPU parameters. For other connection types the password input field is disabled.
The password must not exceed four characters and can consist of alphanumerical characters and standard signs. Blanks are not allowed.

## Remote access password

The password for remote access via QJ71E71 and QJ71C24 is assigned in the CPU parameters of a GX Developer project and downloaded to the target PLC. Passwords set in any relaying units have no effect.

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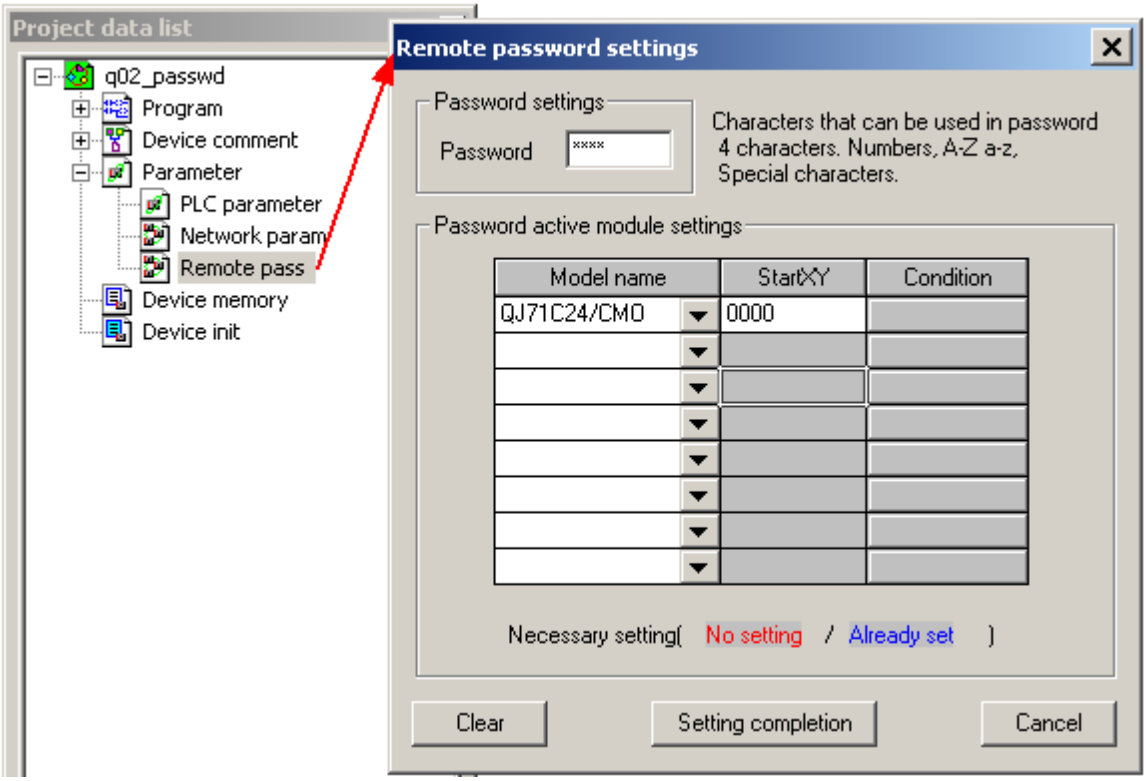


Enter the same password in the 'Password' input field for the connection to gain access to the target PLC.

## 9.3.3 Special Setups

### 9.3.3.1 Communication with Multi-CPU Systems

For a multi-CPU system the user must specify the CPU number of the target CPU, i.e. the last accessed station.
When making access to the non-control CPU of the relay module on the accessed station, use the modules of function version B as the relay modules and Q-CPUs (Q mode) on the own station, all relay stations and accessed station.

#### (Example 1) CPU COM communication

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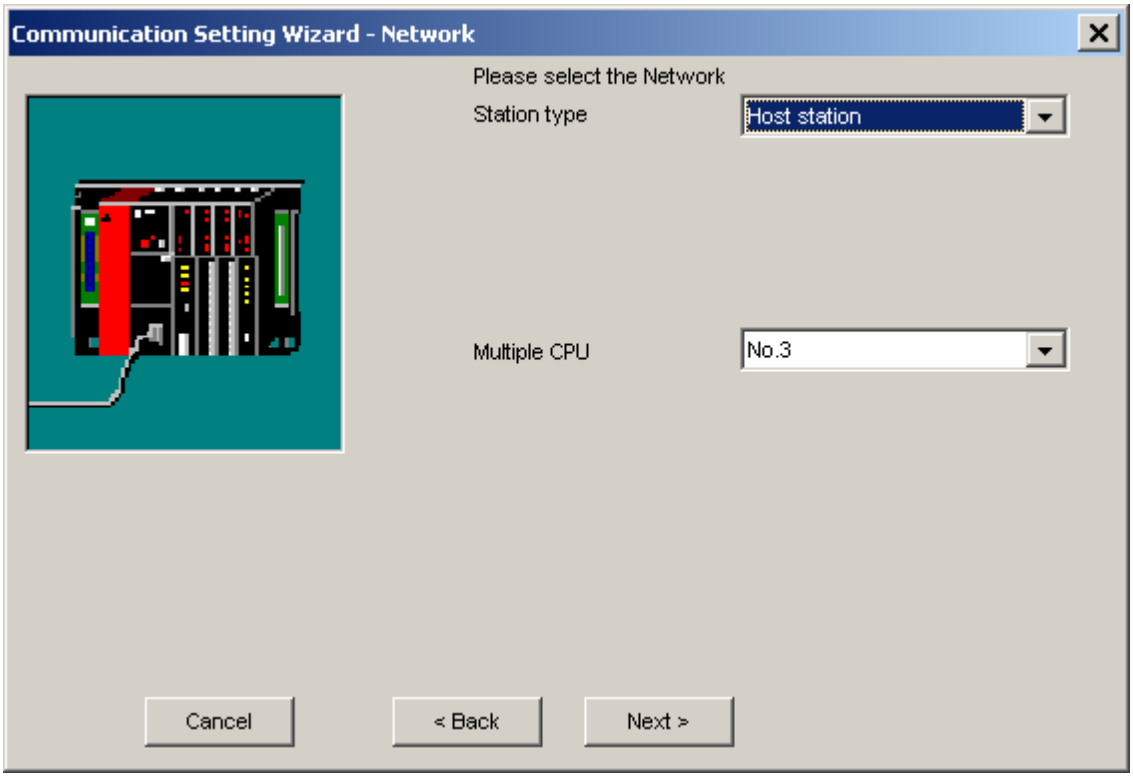
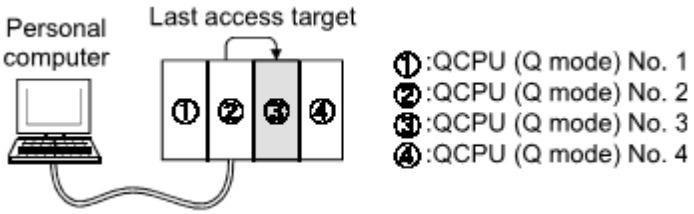



When the user has selected 'No. 3' (0x3E2) in the 'Multiple CPU' field, the connection is established to the third CPU in the rack, marked as (3) in the following figure.




## (Example 2) CPU COM communication (via MELSECNET/H)

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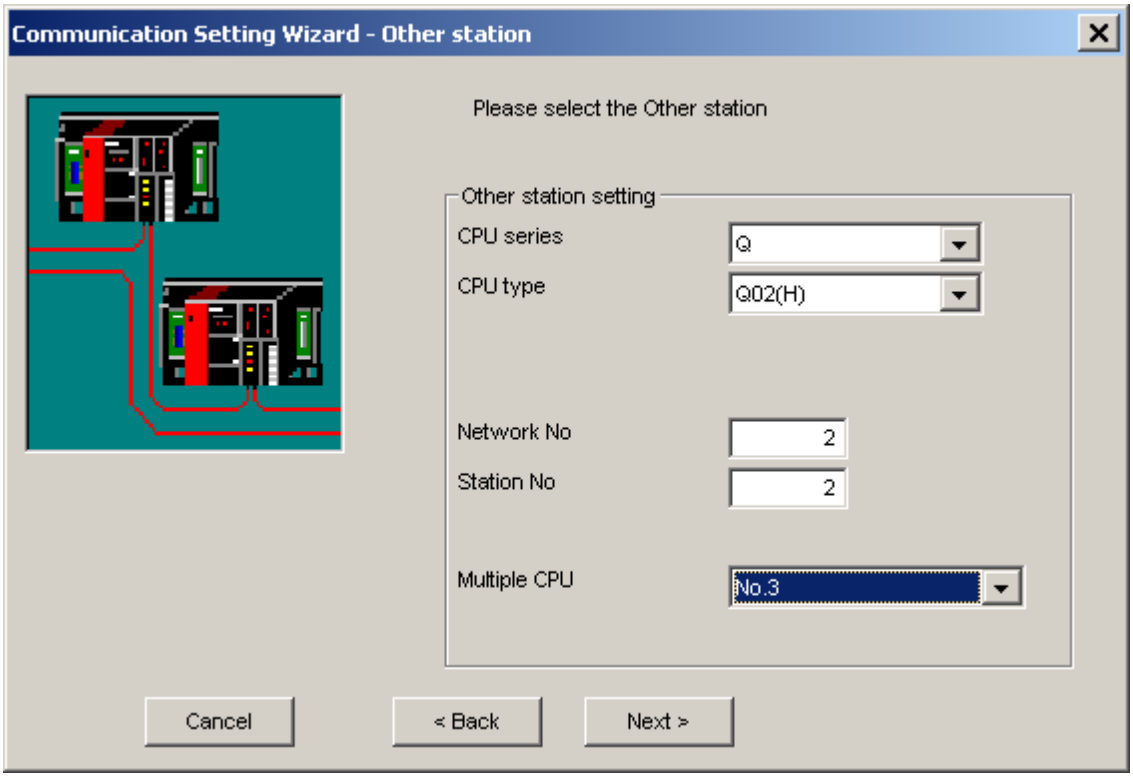
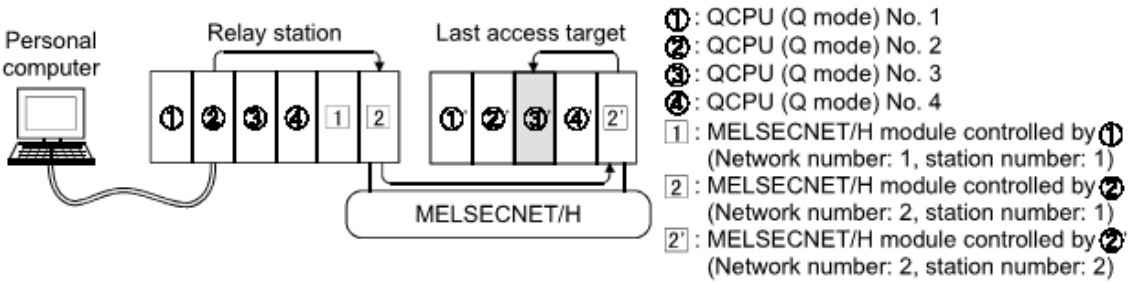



When the user has selected 'No. 3' (0x3E2) in the 'Multiple CPU' field and entered '2' for network and station number, the connection is established to the third CPU in the 'Last access target' rack, marked as (3)' and grayed in the following figure.
The CPU number in the 'Relay station' rack cannot be specified. Therefore, if '1' has been entered as network number for the sample below, an error will occur, because the network number controlled by the CPU (2) is only '2'.


Personal computer
Relay station
Last access target
MELSECNET/H
①: QCPU (Q mode) No. 1
②: QCPU (Q mode) No. 2
③: QCPU (Q mode) No. 3
④: QCPU (Q mode) No. 4
1: MELSECNET/H module controlled by ① (Network number: 1, station number: 1)
2: MELSECNET/H module controlled by ② (Network number: 2, station number: 1)
2': MELSECNET/H module controlled by ②' (Network number: 2, station number: 2)

### 9.3.3.2 Restrictions with Q00, Q00J and Q01 CPUs

The number of network modules is restricted for Q00J, Q00 and Q01 CPUs.

| Type of Network Module | Max. Number of Modules |
|---|---|
| MELSECNET/H module | 1 module |
| Ethernet module | 1 module |
| CC-Link module(Function version B or later) | 2 modules |

The following figures mark network architectures for Ethernet and MELSECNET/H, which are not supported in combination with Q00J, Q00 and Q01 CPUs.

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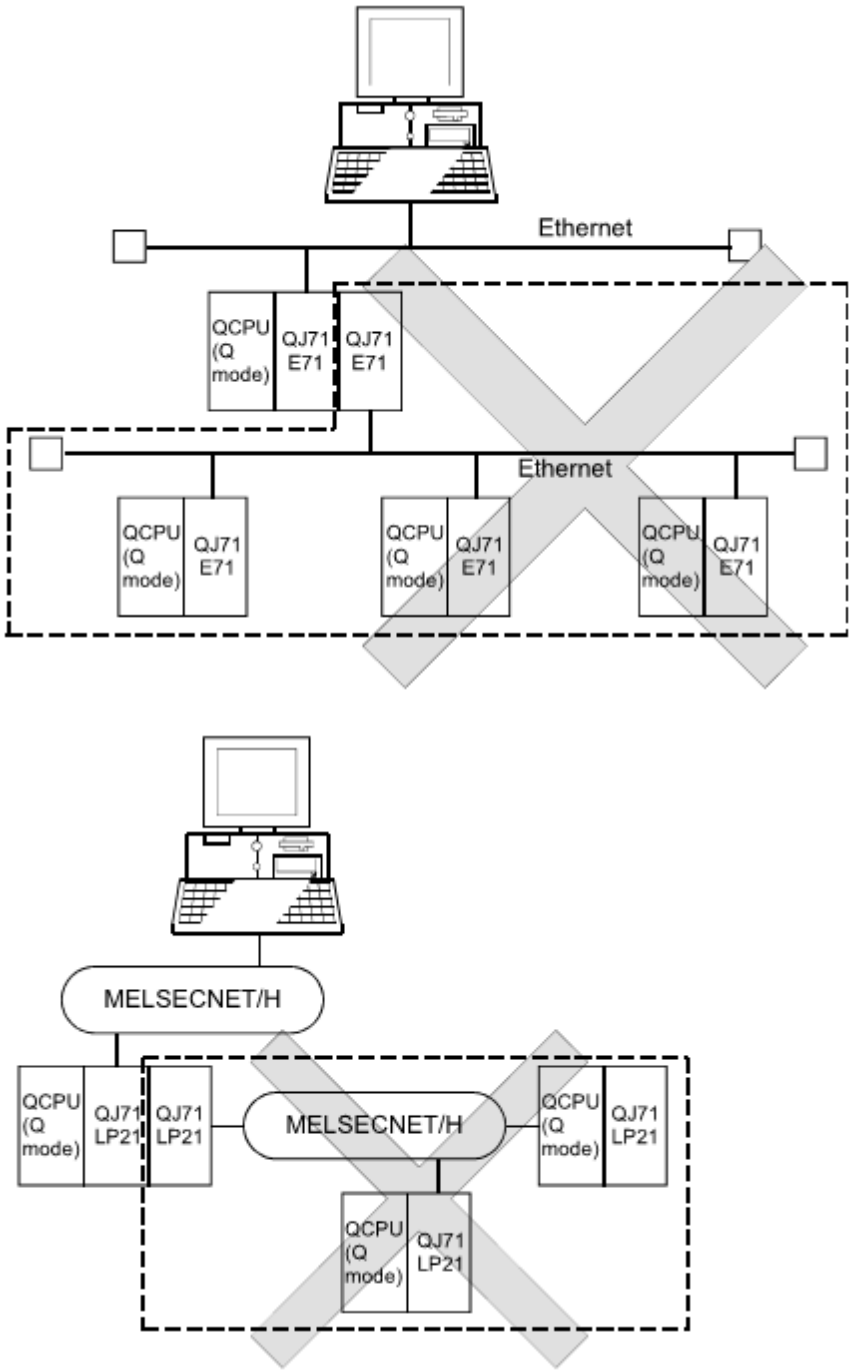
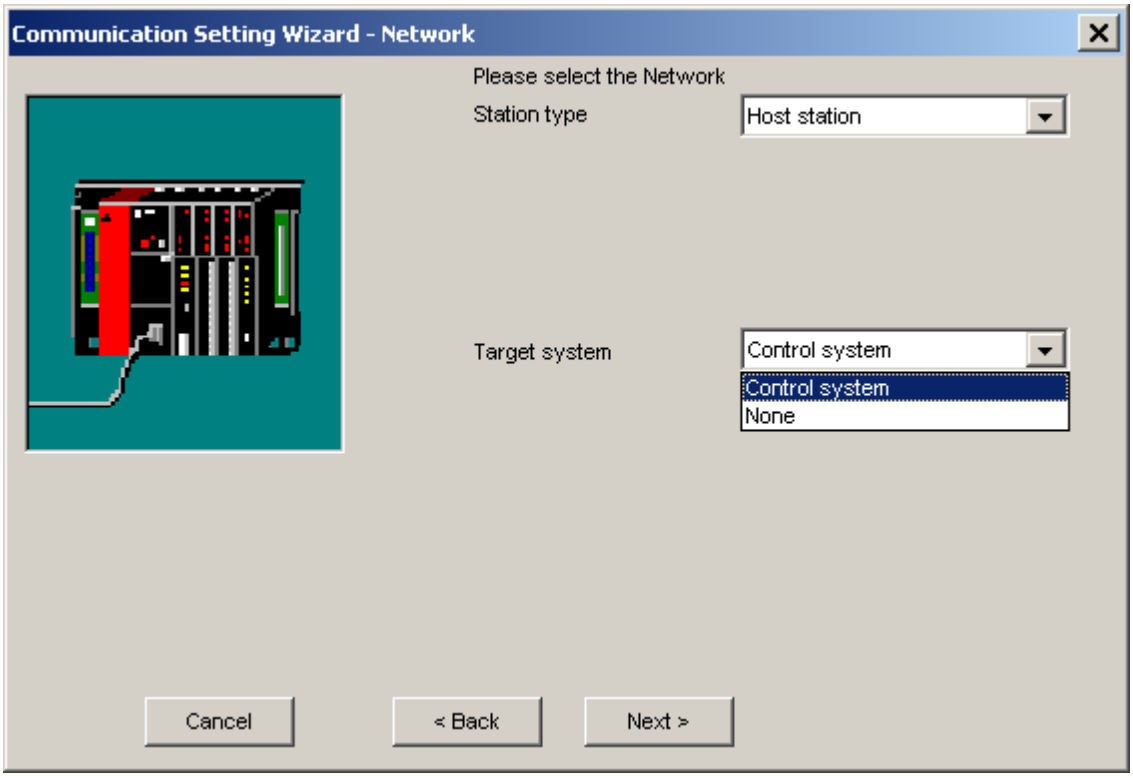



#### 9.3.3.3 Redundant CPUs

The following text describes the configuration for accessing redundant Q series PLC systems, i.e. Q12PRH and Q25PRH.

### (1) Target system




As 'Target system' either 'Control system' or 'None' can be selected.

| Parameter | Values | Description |
|---|---|---|
| Target system | Control system | Connects to the control system and maintains access to the control system after switching control and standby CPU |
| | None | Connects to the target PLC CPU independently of whether it is control or standby system |

**Note:** to determine which CPU in the redundant PLC system is being accessed, the following special relays can be checked.

(1) To distinguish, whether system A or B are accessed

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<table>
<tr><td>SM1511</td><td>System A identification flag</td><td rowspan="2">· identifies system A/system B of a redundant system.<br>· remains ON/OFF even if the tracking cable is disconnected while the redundant system is running.<br><table><tr><th></th><th>System A</th><th>System B</th><th>during TRK.CABLE ERR.<br>(= code 6120)<br>(System not determined)</th></tr><tr><td>SM1511</td><td>ON</td><td>OFF</td><td>OFF</td></tr><tr><td>SM1512</td><td>OFF</td><td>ON</td><td>OFF</td></tr></table></td></tr>
<tr><td>SM1512</td><td>System B identification flag</td></tr>
</table>

(2) When checking the operation system status

<table>
<tr><td>SM1515</td><td rowspan="2">Control/ Standby system status</td><td rowspan="2">· indicates the CPU module operation status<br>· remains ON/OFF even if the tracking cable is disconnected while the redundant system is running.<br><table><tr><th></th><th>Control system</th><th>Standby system</th><th>during TRK.CABLE ERR.<br>(= code 6120)<br>(System not determined)</th></tr><tr><td>SM1515</td><td>ON</td><td>OFF</td><td>OFF</td></tr><tr><td>SM1516</td><td>OFF</td><td>ON</td><td>OFF</td></tr></table></td></tr>
<tr><td>SM1516</td></tr>
</table>

## (2) Operation at occurrence of system switching

When system switching occurs during access to the redundant CPU and 'Control system' has been selected as target system, access is continued as described below.

(a) Connection via other than MELSECNET/H or Ethernet

Access to the control system after system switching is continued.

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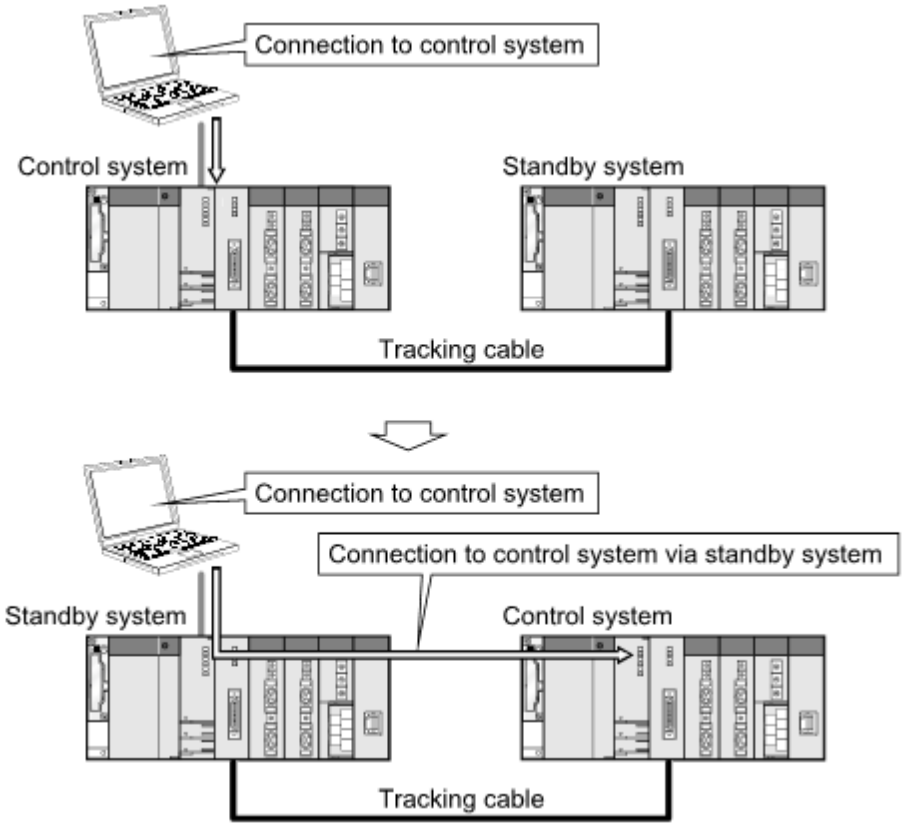


(b) Connection to MELSECNET/H or Ethernet

Access to the control system after system switching is continued as shown below, depending on whether a communication error occurs or not.

The following shows an example of Ethernet connection.

<When communication is normal>

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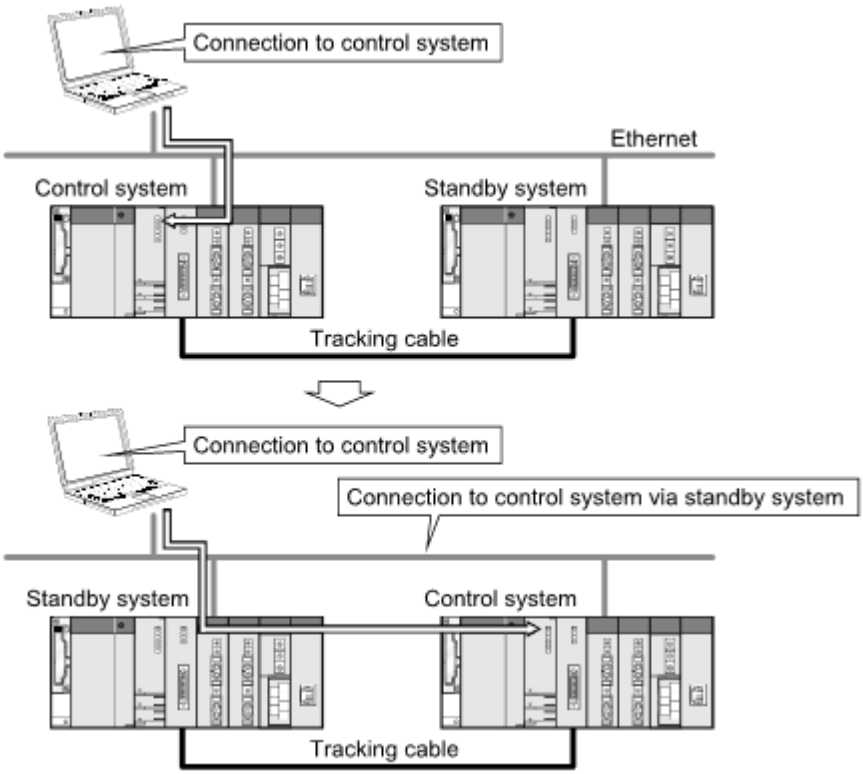
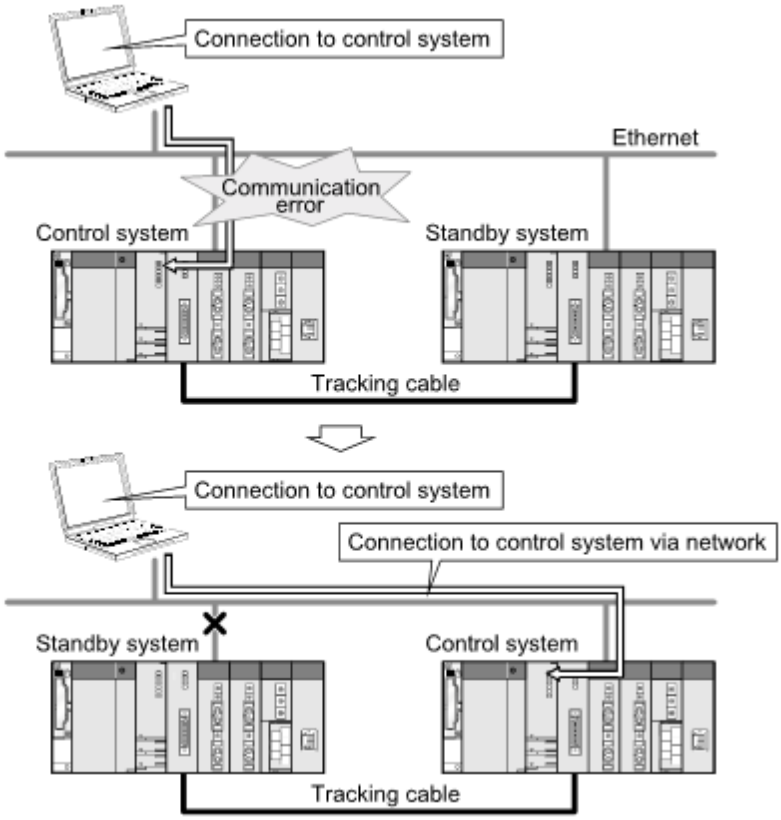



<When communication error occurs>




**Note**: in the case of Ethernet connection, it may take time from when a communication error occurs until communication starts after connection to the control system.

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## (3) Automatic switching of communication route

If a communication error occurs during access to the redundant CPU via a MELSECNET/H or Ethernet network, the
communication route is automatically switched to continue access to the control system.
In the following text this automatic switching of the communication route is referred to as 'route switching'.

The following describes the route switching conditions, how to check for route switching occurrence, and examples of access by route switching.

### (a) Route switching conditions

When access is being made under the following conditions, access to the Redundant CPU is continued by route switching if a communication error occurs.

| Mode | Conditions for continued access |
|---|---|
| Operation mode | Backup mode, Separate mode |
| Target system | Control system |

However, if a tracking error had already occurred at a start of communication (caused for example by power off or reset of the redundant system), access to the control system is not continued by route switching even if tracking is recovered after that.

### (b) How to check for route switching occurrence and examples of access by route switching

#### *1) How to check whether route switching occurred or not*

Special devices and registers allow to detect whether route switching has occurred.

| SM1600[1] | SD1590[2] | SD1690[2] | Possibility of route switching | Reference |
|---|---|---|---|---|
| OFF | either one is other than 0 | | Since a system switching request from the network module was detected, route switching may have been executed. | see example 1 |
| ON | 0 | 0 | Since an other system fault occurred, route switching may have been executed. | see example 2 |
| ON | either one is other than 0 | | Since an other system fault occurred or a system switching request from the network module was detected, route switching may have been executed. | see example 1 and 2 |

[1]: even if SM1600 is ON, route switching does not occur when the CPU is not accessed via the tracking cable.
[2]: when using SM1600, SD1590 and SD1690 to estimate whether route switching has occurred or not for the Redundant CPU connected to Ethernet, check the following items in the redundant setting of the network parameter dialog box of GX Developer.
·issue a system switching request at disconnection detection.
·issue a system switching request at communication error.

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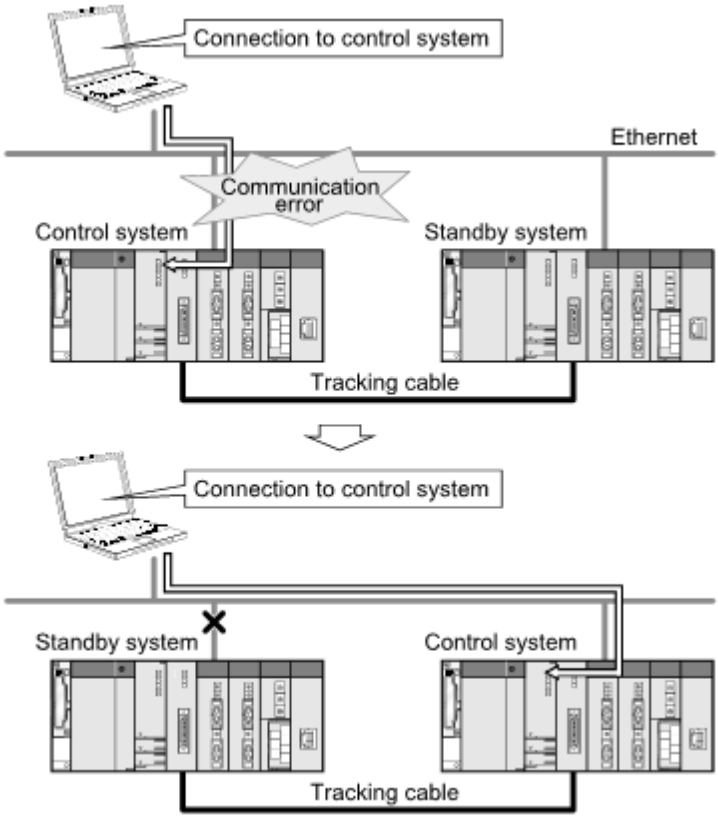
Check the following based on the states of the above special relay and special registers and remove the error cause.
· Check the Redundant CPU for an error.
· Check the tracking cable status and whether the tracking cable is correctly connected.
· Check the relevant network module for an error and the network where the relevant network module is connected for an error.

***2) Examples of access by route switching***

The following shows examples of route switching during access to the control system by Ethernet connection.

When system switching occurs at communication error:




**Route switching example 1**

When standby system fault occurs:

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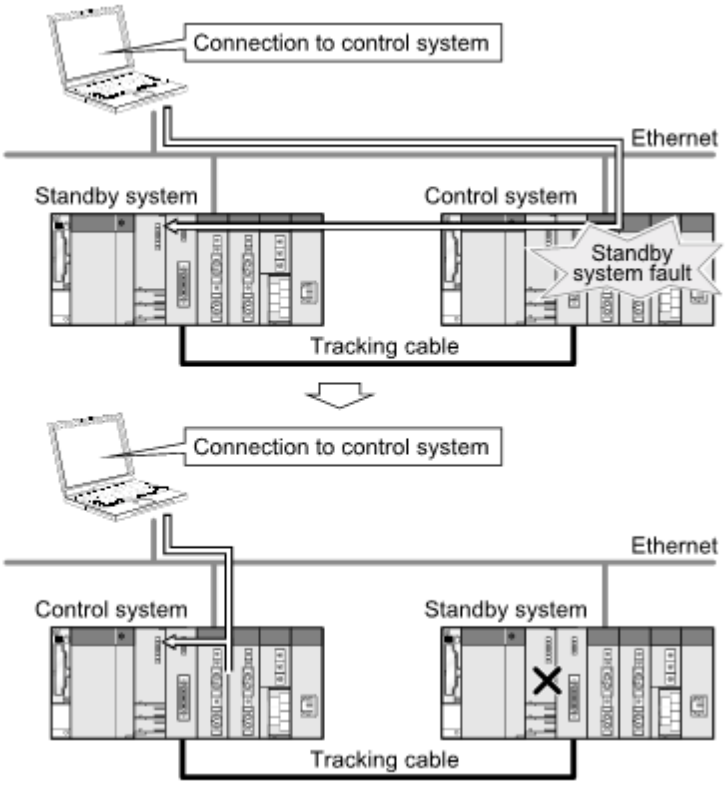


**Route switching example 2**

**Note**: the following table indicates details of the special relay and special registers to be monitored when estimating whether route switching occurred or not.

| Device | Meaning | Explanation |
|---|---|---|
| SM1600 | Other system error flag<br>OFF: No error<br>ON: Error | · turns on when an error occurs during redundant system error check. (Turns on when either of bits for SD1600.)<br>· remains off when no errors are present. |

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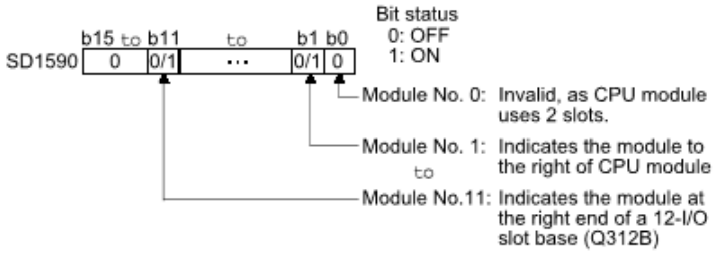
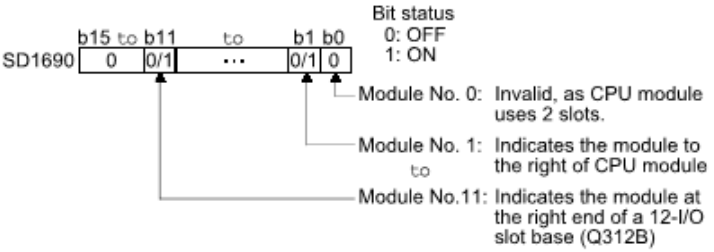
| Device | Meaning | Explanation |
|---|---|---|
| SD1590 | Module no. for network module requesting route switching in host system | · any of the following bits turns on corresponding to module No. for network module requesting route switching in host system.<br>· turns off by the system after recovery from error of the relevant module by user.<br>  <br>· refer to SD1690 for module No. for network module requesting route switching in other system. |
| SD1690 | Module no. for network module requesting route switching in other system | · any of the following bits turns on corresponding to module No. for network module requesting route switching in other system.<br>· turns off by the system after recovery from error of the relevant module by user.<br>  <br>· refer to SD1590 for module no. for network module requesting route switching in host system. |

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